Zeitschrift: Veröffentlichungen des Geobotanischen Institutes der Eidg. Tech. Hochschule, Stiftung Rübel, in Zürich

Herausgeber: Geobotanisches Institut, Stiftung Rübel (Zürich)

Band: 106 (1991)

Artikel: A comparative phytogeographic essay of extrazonal steppe vegetation of Volhynia (Ukraine) and Lublin Uplands (Poland) and other regions of Europe

Autor: Melnik, Victor J.

DOI: https://doi.org/10.5169/seals-308919

Veröff. Geobot. Inst. ETH, Stiftung Rübel, Zürich , *106* (1991), 66-79

A comparative phytogeographic essay of extrazonal steppe vegetation of Volhynia (Ukraine) and Lublin Uplands (Poland) and other regions of Europe

Victor J. MELNIK

1. INTRODUCTION

The participation of the author in the work of the 19th IPE was preceded by investigation of extrazonal steppe vegetation of the Volhynia upland in the Ukraine directly adjacent to the Poland. Only the river Bug separates the Volhynia Upland from the Lublin Upland. During the excursion much attention was given to the steppe communities of Lublin and of Cracow-Wielun Upland. As they occupy the centre of the European extrazonal steppes, it seems advisable to point out their phytogeographic links with analogous communities of Western and Eastern Europe.

Acknowledgements
I express my profound gratitude to Prof. Dr. E. Landolt, director of the Geobotanical Institute, Swiss Federal Institute of Technology, Rübel Foundation, Zürich, and to Prof. Dr. K. Zarzycki, director of the W. Szafer Institute of Botany of the Polish Academy of Sciences, Krakow, for the invitation to take part in the 19th IPE as well as to Dr. J. Piorecki, director of the Bolestraszyce Arboretum near Przemysl, for assistance in conducting studies in the territories not included into the 19th IPE route.

2. MATERIAL AND METHODS

Contrary to zonal Ukrainian and southern Russian steppes, extrazonal steppes of Western and Eastern Europe are spread as small islands among forest landscapes and confined to dry and well warmed up slopes with S, SW and SE ex-

position where cretaceous rocks and loess loams come to the surface.
Extrazonal steppes of the Volhynia and Lublin Uplands occupy the central place among analogous communities of Europe and are the most northern sites of steppe vegetation in the Ukraine and Poland.
The Volhynia Upland is situated within the Volhynia and Rovno administrative regions of the Ukraine and presents a small elevated island surrounded by Polessian landscapes from the North, South and East. This upland is separated by the valley of the river Bug in Poland from the Lublin Upland. From the northeast the Polessian Lowland is adjacent to it, from the north, the Nizina Mazowiecka lowland, from the south, the Nizina Sandomierska lowland and Roztocze. The geological base of both uplands are cretaceous rocks, just below emerging, crossed with loess loams of light composition.
The climate is moderately continental, the annual precipitation is 600-620 mm in the Volhynia Upland and 550 mm in the Lublin Upland.
Mountain forest podzolised soil, podzolised and typical chernozems formed on the cretaceous rocks, and loess loams prevail in the soil cover of the Volhynia and Lublin Uplands. Extrazonal steppes are confined to the steep slopes with rendzinas on cretaceous soil and loess.
Information about Lublin Upland steppe is given by many authors (e.g. MEDWECKA-KORNAS (1960) and FIJALKOWSKI (1972). The steppe communities belong to the alliance *Festucion valesiacae* of the *Festucetalia valesiacae* order, *Festuco-Brometea* class. There are two reserves, three monuments of nature and 15 projected reservations for protection of the extrazonal steppe vegetation in the Lublin Upland (FIJALKOWSKI 1972).
ROGOVICH (1869) and PACZOSKI (1891, 1896, 1899) informed about steppe species *Adonis vernalis*, *Prunus fruticosa*, *Linum flavum* and others in the cretaceous slopes of the Volhynia Upland. Steppe vegetation of the Vishnevaya mountain near Rovno is described in detail by PANEK (1930, 1931, 1933) and DIDUKH (1974). Vegetation of the site Uliyana near town Lutsk with *Adonis vernalis*, *Aster amellus*, *Carlina acaulis*, *Linum flavum* and others is characterized by MACKO (1937). ZAVERUKHA (1960) presented for the western part of the Volhynia upland 14 extremely scarce floristical fragments of steppe communities.
Steppe vegetation is representative in the Volhynia Upland only in the degraded mountains Vishneva near vil. Gorodok, not far from Rovno, Lysa and Kvitucha near vil. Milcha, Dubno district, Rovno region. Vegetation of the Vishneva mountain is described in the mentioned works of PANEK and DIDUKH. The formations *Cariceta humiliae*, *Stipeta capillatae*, *Festuceta vale-*

siacae and communities *Thymus marschallianus* and *Inula ensifolia* are the most important. Vegetation of the Lysa and Kvitucha mountains will be considered in the chapter "Results".

Field studies were performed not only in the Volhynia and Lublin Uplands but also on Podolian and Pridneprovian Uplands (Ukraine) and Cracow-Wielun Uplands (Poland). Phytocenological descriptions of plants formations and associations were performed in compliance with the methods and principles of the Soviet geobotanical school. However, it was not an obstacle for comparing our descriptions of vegetation with those of Polish botanists and botanists of other European countries performed according to the Braun-Blanquet method.

3. RESULTS

3.1. The Lysa mountain (Fig. 1).

The Lysa mountain, NW of the vil. Milcha, Dubno district, Rovno region, occupies an area of 4 ha. It presents a farewell rock of 70 m height composed of chalk displaying itself on the mountain top. The cretaceous rock at the foot of

Fig. 1. The Lysaya mountain in the Volhynia Upland.

the mountain is overlapped with loess loams whose thickness decreases with an increase of the absolute mountain height from 1.5 to 0.1 m. Soils are rendzinas. The slopes with SE, S and SW exposition are covered with mottled grass meadows of *Festuceta valesiacae* and *Cariceta humiliae* formations.
The ***Festuceta valesiacae* formation** is confined to the top of the mountain (thickness of the humus horizon 5-20 cm, in some places even completely washed out; projective grass cover 60-90%). The grass cover is three-layered: the first layer is rare, with single plants of *Echium vulgare, Salvia verticillata, Stachys germanica.* The second layer shows scarcely *Festuca valesiaca* (projective cover 20-80%), *Koeleria cristata* (10%), *Medicago falcata* (10%), and scarcely spread *Adonis vernalis, Asperula cynanchica, Allium montanum, Allium sphaerocephalum, Anemone silvestris, Bupleurum falcatum, Campanula bononiensis, Campanula sibirica, Centaurea rhenana, Galium vernum, Euphorbia cyparissias, Linum flavum, Trinia kitabelii* and other species.The third layer is formed by *Carex humilis* (10-20%), *Potentilla arenaria* (10-15%), *Teucrium montanum* (5%), *Daphne cneorum, Thymus pulegioides, Teucrium chamaedrys* (1%) and some other species (<1%).
The following associations are distinguished: *Festuca valesiaca + Koeleria cristata, Festuca valesiaca + Potentilla arenaria, Festuca valesiaca + Carex humilis.*
The ***Cariceta humiliae* formation** is confined to gentle slopes with a well developed humus horizon. The grass cover (50-95%) is three-layered. The first layer with *Salvia pratensis, Salvia verticillata, Scabiosa ochroleuca, Thalictrum minus* is weakly expressed. The second layer with *Festuca valesiaca* (5-15%), *Adonis vernalis, Anthericum ramosum, Astragalus onobrychis, Bupleurum falcatum, Centaurea rhenana, Euphorbia cyparissias, Inula ensifolia, Lembotropis nigricans, Linum flavum, Medicago falcata, Prunella grandiflora, Ranunculus zapalowiczii, Stachys recta, Veronica spicata* (1-5%) and some other species (less than 1%). The third layer with *Carex humilis* (15-50%), *Potentilla arenaria* (5-10%), *Daphne cneorum, Teucrium montanum* (1-5%) and some other species (<1%).
The following associations are distinguished: *Carex humilis + Festuca valesiaca, Carex humilis + Teucrium chamaedrys.*

3.2. The Kvitucha mountain

The Kvituchaya mountain is situated 10 km from Lysa mountain, SW of the vil. Milcha, Dubno district, Rovno region, and presents a system of erosion

Table 1. Floristic composition of steppe communities of the Volhynia Uplands in Ukraine (A) and the Lublin Uplands in Poland (B, according to FIJALKOWSKI 1972 and others).

Species	A	B	Species	A	B
Achillea millefolium	+	+	*Dianthus borbasii*	+	-
Acinos arvensis	+	+	*Echium russicum*	+	+
Adonis vernalis	+	+	*Elytrigia intermedia*	+	+
Agrimonia eupatoria	+	+	*Equisetum arvense*	+	+
Agrostis tenuis	+	+	*Eryngium campestre*	+	-
Ajuga genevensis	+	+	*Eryngium planum*	+	+
Allium montanum	+	+	*Euphorbia cyparissias*	+	+
Allium oleraceum	+	+	*Euphorbia seguieriana*	+	-
Allium scorodoprasum	+	+	*Euphorbia stricta*	+	+
Allium sphaerocephalum	+	-	*Euphorbia volhynica*	+	-
Alyssum calycinum	+	+	*Festuca valesiaca*	+	+
Anemone silvestris	+	+	*Filipendula hexapetala*	+	+
Anthemis tinctoria	+	+	*Fragaria viridis*	+	+
Anthericum ramosum	+	+	*Galium boreale*	+	+
Anthoxanthum odoratum	+	+	*Galium vernum*	+	+
Anthyllis polyphylla	+	+	*Genista tinctoria*	+	+
Aristolochia clematitis	+	+	*Glechoma hederacea*	+	+
Asparagus tenuifolius	+	+	*Gypsophila fastigiata*	+	+
Asperula cynachica	+	+	*Hieracium pilosella*	+	+
Aster amellus	+	+	*Helianthemum nummularium*	+	-
Berberis vulgaris	+	+	*Helichrysum arenarium*	+	+
Botriochloa ischaemum	+	-	*Helictotrichon pubescens*	+	-
Briza media	+	+	*Inula hirta*	+	+
Bupleurum falcatum	+	-	*Inula ensifolia*	+	+
Calamintha acinos	+	+	*Inula salicina*	+	+
Campanula bononiensis	+	+	*Iris aphylla*	+	+
Campanula sibirica	+	+	*Jurinea arachnoidea*	+	-
Carduus nutans	+	+	*Jurinea calcarea*	+	-
Carex humilis	+	+	*Koeleria cristata*	+	+
Carex michellii	+	+	*Koeleria gracilis*	+	+
Carlina acaulis	+	+	*Lavatera thuringiaca*	+	+
Carlina onopordifolius	+	+	*Lembotropis nigricans*	+	+
Centhaurea jacea	+	+	*Leontodon hispidus*	+	+
Centhaurea rhenana	+	+	*Ligustrum vulgare*	+	+
Centhaurea scabiosa	+	+	*Linosyris vulgaris*	+	+
Cerasus fruticosa	+	+	*Linaria vulgaris*	+	+
Cerinthe minor	+	+	*Linum flavum*	+	+
Chamaecytisus austriacus	+	-	*Linum perenne*	+	+
Chamaecytisus ruthenicus	+	+	*Lonicera caprifolium*	+	+
Chrysanthemum corymbosum	+	+	*Lotus corniculatus*	+	+
Clematis recta	+	+	*Matricaria indora*	+	+
Coronilla coronata	+	-	*Medicago falcata*	+	+
Cytisus albus	-	+	*Medicago lupulina*	+	+
Dactylis glomerata	+	+	*Melica nutans*	+	+
Daphne cneorum	+	-	*Melilotus albus*	+	+
Daucus carota	+	+	*Melilotus officinalis*	+	+
Dianthus armeria	+	+	*Nepeta nuda*	+	+

Table 1 (continued)

Species	A	B	Species	A	B
Nonnea pulla	+	+	*Scorzonera purpurea*	+	+
Onobrychis arenaria	+	+	*Senecio campestris*	+	+
Onobrychis vicifolia	+	+	*Senecio czernjaevii*	+	-
Orchis militaris	+	+	*Senecio jacobaea*	+	+
Orchis nervulosa	-	+	*Silene inflata*	+	+
Origanum vulgare	+	+	*Sisimbrium junceum*	+	-
Otites eugeniae	+	-	*Stachys germanica*	+	+
Peucedatum alsaticum	+	+	*Stachys recta*	+	+
Phleum phleoides	+	+	*Stipa capillata*	+	+
Phlomis tuberosa	+	-	*Stipa pennata*	+	+
Pimpinella major	+	+	*Symphytum tuberosum*	+	+
Pimpinella saxifraga	+	+	*Teucrium chamaedrys*	+	+
Primula veris	+	+	*Teucrium montanum*	+	-
Poa compressa	+	+	*Thalictrum minus*	+	+
Polygala comosa	+	+	*Thymus marschallianus*	+	+
Potentilla arenaria	+	+	*Thymus pulegioides*	+	+
Prunella grandiflora	+	+	*Tragopogon orientalis*	+	+
Ranunculus bulbosus	+	+	*Tragopogon pratensis*	+	+
Ranunculus polyanthemos	+	+	*Trifolium alpestre*	+	+
Ranunculus zapalowiczii	+	-	*Trifolium arvense*	+	+
Reseda lutea	+	+	*Trifolium montanum*	+	+
Rhamnus catharica	+	+	*Trinia henningii*	+	-
Rosa canina	+	+	*Trinia kitaibelli*	+	-
Rosa pendulina	+	+	*Verbascum phoeniceum*	+	+
Salvia dumetorum	+	-	*Veronica prostrata*	+	+
Salvia pratensis	+	+	*Veronica spicata*	+	+
Salvia silvestris	+	+	*Vicia cracca*	+	+
Salvia verticillata	+	+	*Vicia tenuifolia*	+	+
Saxifraga granulata	+	+	*Vincetoxicum officinale*	+	+
Scabiosa ochroleuca	+	+			

farewell rocks. The steppe green is confined to the gentle slopes of SW exposition and occupies an area of about 40 ha. The geological base of the Kvituchaya mountain is composed of cretaceous rocks overlapped everywhere with loess loams whose thickness is 1.0-1.5 m. Soils are rendzinas. The plant cover of Kvitucha mountain presents grass-forb meadow steppe with the same formations as the steppes of the Lysa mountain, but with more meadow species. The **formation *Festuceta valesiacae*** occupies the top of the mountain and the upper part of the slopes. The first layer is rare, with *Eryngium planum*, *Salvia pratensis*, *Salvia verticillata*, *Sambucus ebulus*. In the second layer are *Festuca valesiaca* (30-60%), *Carex humilis* (10-15%), *Koeleria cristata* (5-10%), *Adonis vernalis*, *Allium sphaerocephalum*, *Asperula cynachica*, *Bupleurum falcatum*, *Campanula bononiensis*, *Campanula sibirica*, *Gypsophila fastigiata*, *Hypericum perforatum*, *Euphorbia cyparissias*, *Medicago falcata*, *Medicago lupulina*, *Phleum phleoides*, *Primula veris*, *Vincetoxicum hirundinaria* (1-5%) and others (<1%). The third layer shows *Carex humilis* (10-15%), *Potentilla arenaria* (5-10%), *Cerinthe minor*, *Daphne cneorum*, *Teucrium chamaedrys*, *Teucrium montanum* (1-5%).

The following associations are distinguished: *Festuca valesiaca* + *Koeleria cristata*, *Festuca valesiaca* + *Potentilla arenaria*, *Festuca valesiaca* + *Carex humilis*.

The **formation *Cariceta humiliae*** occupies the gentle slopes at the foot of the mountain. Herbage is two-layered (projective cover is 50-80%). The first layer is formed by *Festuca valesiaca* (10-15%), *Koeleria cristata* (5-10%), *Anemone silvestris*, *Campanula bononiensis*, *Campanula sibirica*, *Origanum vulgare* (1-5%). The second layer is formed by *Carex humilis* (10-15%), *Potentilla arenaria* (10-15%), *Teucrium montanum* (5%), *Daphne cneorum*, *Teucrium chamaedrys* and others (<1%). The following associations are distinguished: *Carex humilis* + *Festuca valesiaca*, *Carex humilis* + *Koeleria cristata*, *Carex humilis* + *Potentilla arenaria*.

A group of *Teucrium montanum* is confined to the cretaceous SW slopes of the Kvitucha mountain (projective cover 50%). The first unclosed rare layer is formed by *Campanula bononiensis*, *Campanula sibirica*, *Hypericum perforatum*, *Eringium planum*, *Origanum vulgare*. The second layer (30-50%) is dominated by *Teucrium montanum*, *Teucrium chamaedrys*, *Thymus pulegioides* scarcely occur.

Floristic composition of steppe communities in the Volhynia Upland and Lublin Upland were compared (Table 1).

4. DISCUSSION

The floristic composition of the Volhynia and Lublin steppes differ slightly (Table 1). However, some species (e.g. *Daphne cneorum*, *Euphorbia volhynica*, *Ranunculus zapalowiczii*, *Teucrium montanum*), rare in the Volhynia steppes, are absent in the Lublin upland. They are common for the steppe communities of the Volhynia Upland and west of the Podolian upland which is separated from the Volhynia upland by a narrow strip of the Male Poles'ye. Islands of steppe vegetation of the western Podolia occupy 1-4% of the total area (about 20'000 ha) (KUKOVITSA 1984). The Podolian steppe differs from the Volhynia one in a great phytocenotic variety, however, the same forma-

tions as in the Volhynia steppe dominate: *Cariceta humiliae*, *Festuceta valesiacae*, *Stipeta capillatae* and others. In contrast to the Volhynia steppes, the west Podolian steppes are floristically richer (504 species) (KUKOVITSA 1984). The above mentioned species of the steppe communities common for Volhynia-Podolia are preserved in composition of their flora from the Neogene. There are only ten places where *Ranunculus zapalowiczii* occurs (ZAVERUKHA 1985, and herbarium data). This species is close to the West European *Ranunculus oreophilus* found in the Carpathians in Poland (SZAFER et al. 1986). Seven localities of *Teucrium praemontanum* are known in Volhynia-Podolia (DIDUKH 1972, and herbarium data). This taxon is considered as different from the western European *Teucrium montanum*, or as a variety of *Teucrium montanum* (ZAVERUKHA 1985). In Poland, it is only known in the Pieniny (SZAFER et al. 1986). *Euphorbia volhynica*, narrow endemic of Volhynia-Podolia (ZAVERUKHA 1985) is Pliocene relict.
The European mountain-lowland species *Daphne cneorum* is also a Neogene relict of the Volhyñia-Podolia (SZAFER 1923, 1930, KORNAS 1948). In the Ukraine the species grows in two isolated island fragments: in the near Dnieper area and in Volhynia-Podolia. In the near Dnieper area *Daphne cneorum* grows in pine and oak-pine forests, in the Volhynia-Podolia and Volhynia Poles'ye, in pine, oak-pine forests and meadow steppes (MELNIK 1986). KOCZWARA (1925) presented first *Daphne cneorum* for the steppe communities of *Cariceta humiliae* on the farewell mountains Bila, Lysa, Zhulitska and Makitra in Podolia, where is preserved till now (ZHIZHIN and STOIKO 1980).
As mentioned above, growing conditions are analogous for the Lysa and Kvitucha mountains in the Volhynia Upland. Common endemic and relict species prove the common character of the origin of the Volhynia and Podolian steppes. Proceeding from the presence of *Daphne cneorum*, *Coronilla coronata* and other forest species in the steppe flora in western Podolia as well as the presence of fossil pollen of the conifers in the Neogene deposits KOCZWARA (1925) led to a relict character of the meadow-steppe vegetation of Podolia and the genetic relation with Neogene pine forests. SHELYAG-SOSONKO et al. (1975) assumed that the Podolian steppes were formed by cold-induced decumbation of the tree layer of light submediterranean forests in the territory of Podolia at the end of the Neogene. The fact that *Daphne cneorum* is typical for light submediterranean forests of the *Orno-Ericion carneae* alliance (JAKUCZ 1961) seems to sustain this hypothesis, as well as the presence of relict Tertiary forests in the Podolia territory (SHELYAG-SOSONKO et al. 1975). Relict cretaceous pine forest is also preserved in the Volhynia Upland (300 ha

near vil. Krupetz in Chervonoarmeisk district, Rovno region) with *Juniperus communis*, *Chamaecytisus blockianus*, *Carex flacca*, *Cephalanthera damasonium*, *Cypripedium calceolus*, *Daphne cneorum*, *Helianthenum nummularium*, *Koeleria grandis*, *Linum flavum* (ANDRIENKO 1987).

Contrary to the Volhynia and Podolian Uplands which were not under glaciation, the Lublin Upland was covered with Krakowian glaciation (SZAFER 1977). The Volhynia-Podolian steppes were formed autochthonously, the Lublin steppes by migration not only from the Podolian center (SZAFER 1977) but also from the Volhynian one.

The phytogeographical classification of the Volhynia steppes and their relations to the Lublin steppes are not clearly defined. SHELYAG-SOSONKO et al. (1975), SHELYAG-SOSONKO and KUKOVITSA (1980) relate the Volhynia-Podolian steppes to the steppes of central Europe. LAVRENKO (1980) classes the Volhynia-Podolian steppes with the eastern European meadow steppes and steppe-like meadows. To solve this problem it is necessary to consider phytogeographic relations between the Volhynian and Lublin steppes and the green meadow-steppes of all Europe.

During my stay in Poland, I visited two steppe sites not included in the route of the 19th IPE: 1) the locality Konary near Klimontow with *Ceraseta fruticosae* confined to the steep loess slopes, with *Cerasus fruticosa*, *Anemone silvestris*, *Berberis vulgaris*, *Centaurea rhenana*, *Fragaria viridis*, *Galium vernum*, *Helichrysum arenarium*, *Inula ensifolia*, *Medicago falcata* and other species; 2) the Panienska Gora in the vicinity of town Sandomierz composed of *Stipeta capillatae* (projective cover 50-80%), *Stipa capillata*, *Adonis vernalis*, *Berteroa incana*, *Campanula sibirica*, *Centaurea rhenana*, *Cerasus fruticosa*, *Galium vernum*, *Eryngium planum*, *Hieracium pilosella*, *Linaria vulgaris*, *Medicago falcata*, *Origanum vulgare*, *Scabiosa ochroleuca*, *Teucrium chamaedrys*, *Thymus pulegioides*, *Stipa pennata*, *Veronica spicata* and other species.

Further westward extrazonal steppes occur in Poland (Silesia) and Pomerania (MEDWECKA-KORNAS 1960). From Poland and Czechoslovakia small islands of steppes stretch out westwards to southern France and from Yugoslavia northwards to the Rhine valley (ELLENBERG 1986). According to ELLENBERG secondary sites of the steppe vegetation which appeared under the action of anthropogenic factors prevail in Middle Europe, original extrazonal meadow-steppe sites of the formation *Festucetalia valesiacae* of the *Festuco-Brometea* class are considerably rare in poor calcareous soils.

WITSCHEL (1980) studied the meadow steppes of Baden-Württemberg (Ger-

many) confined to the dry warm slopes of S-exposition with outcome of the rocks on the surface, with *Carex humilis* dominating. Comparisons of our phytocenotic descriptions of the steppes of Volhynia (Ukraine) with those of WITSCHEL (1980) showed many common species (e.g. relict species *Daphne cneorum*, *Teucrium montanum*, and instead of *Ranunculus oreophilus* the vicarious *Ranunculus zapalowiczii*).
Since *Daphne cneorum* avoids cultivated meadows and secondary steppe communities it is a good indicator of the original communities and a relict character of the primary meadow-steppe communities of central Europe (WITSCHEL 1980, 1984, WITSCHEL and SEYBOLD 1986). *Daphne cneorum* as well as *Pulsatilla vulgaris* and the leaf-stem bryophytes *Hylocomium splendens* and *Pleurozium schreberi* indicate the genetic connection of the primary meadow steppes with relict pine forests *Cytiso-Pinetum* which are preserved in Baden-Württemberg since Neogene. Similar sites with *Daphne cneorum* are also known in other European countries, e.g. France, Switzerland, Italy, Yugoslavia, Rumania (e.g. AYMONIN 1958, WITSCHEL and SEYBOLD 1986).
LAVRENKO (1980) described "lowered Alps" in central Russia with forb low-sedge calciphyte steppe communities with *Carex humilis* and *Daphne cneorum*, confined to shallow chernozem soils underlain with chalk on N, NW and W expositions. The plant cover is formed by the associations *Stipa pennata + Daphne cneorum + Carex humilis*, *Stipa capillata + Daphne cneorum + Carex humilis*, *Daphne cneorum + Carex humilis*, *Stipa pennata + Festuca valesiaca + Carex humilis*, *Festuca valesiaca + Koeleria grandis + Carex humilis* and others (KOZO-POLANSKY 1911, 1931, BARABASH and GOLITZIN 1962, GOLITZIN 1965, NESHTAEV and SOBAKINSKYCH 1976, VASILCHENKO 1977, and others).
Ephedra distachya, *Helictotrichon desertorum*, *Schiverekia podolica* are absent in the Volhynia but grow in the Podolia and central Russia. The meadow steppes of central Europe, Volhynia-Podolia and the "lowered Alps" are genetically linked with pine forests (VINOGRADOV and GOLITZIN 1965).
Daphne cneorum fossil seeds were found in the upper Pliocene in the central Russian Upland (DOROFEEV 1986).
Proceeding from the similarity of floristical composition and ecological-phytocenotic peculiarities of the steppe communities of the Middle Russian and Volhynia-Podolian uplands LAVRENKO (1980) unites them into one type of Podolian and Middle-Russian petrophyte meadow steppes. However, steppes of this type are met also in the area between Volhynia-Podolian and Middle-

Russian uplands. SAKALO (1955) described steppe sites of the near-Desna plateau in the Summy region of the Ukraine adjacent to the central Russian upland, confined to the outcomes of cretaceous and loess sediments in the valley of the Desna. He referred the sites to petrophyte meadow steppes with the formations *Festuceta valesiacae* and *Cariceta humiliae* and associations *Carex humilis + Festuca valesiaca, Festuca valesiaca + Carex humilis.*

The steppe sites are derivatives of the periglacial steppes (SAKALO 1955). Near-Dnieper Upland (the Chernecha mountain in the vicinity of villages Yablunivka and Malaya Smilyanka of Smilyanskian district, Cherkassy region, at the rivers Tyasmin and Gnilij Tashlyk, in Talievy Burty in the vicinity of vil. Chaplinka of Kiev region), adjacent to the Podolian upland, was described by KLEOPOV (1928, 1933). Steppe "islands" are confined to the outcomes of the Ukrainian crystalline shield rocks and loesses to the surface. The vegetation is presented by communities *Stipeta capillatae, Festuceta valesiacae, Pruneta fruticosae* and others. *Carex humilis* occurs as a rare species while *Daphne cneorum* growing in the pine forests of the region is absent.

In 1988 a new site of extrazonal steppe vegetation N of the near Dnieper upland within the Kiev loess plateau in the vicinity of vil. Tulintsy, Mironovka district, Kiev region on loess slopes of N, NE and NW expositions, with the communities *Stipeta capillatae, Stipeta pennatae, Festuceta valesciacae* was described (MELNIK unpubl.). Sites of steppe green as small rare islands in the Western Europe are spread between the Volhynia-Podolian and central Russian Uplands, further westward they are only in the Oka Don lowland (LAVRENKO 1980).

A comparison of the Volhynian and Lublin steppes with analogous communities of other regions of Europe does not permit exact distinction between western and eastern European extrazonal steppes as did LAVRENKO (1980) and SHELYAG-SOSONKO et al. (1980). Undoubtedly the steppes of Baden-Württemberg and the central Russian uplands differ floristically. However, the presence of common features for these regions as well as of Volhynia-Podolian Upland indicates the common genesis of the European extrazonal steppes. Phytogeographical and palaeontological data testify that extrazonal European steppes are derivatives of the Neogene pine forests. Despite of the Pleistocene glaciation these relict forest communities were not completely exterminated in Europe (LAVRENKO 1981, and others). Still the greater part of these forests as a result of cold-induced decumbation of the tree layer is transformed into periglacial steppes to which one refers according to LAVRENKO (1981) the steppes existing in the period of glacial phases of the Pleistocene under condition of extreme continental climate. This idea was for the first time expressed by KLEOPOV (1941); however, he wrote about migration origin of the European periglacial steppes from Asia. The autochthonous formation of periglacial steppes in Europe seems more logical. In the plant cover of the periglacial steppes of Europe *Carex humilis, Festuca valesiaca, Stipa capillata* and others are predominant (KLEOPOV 1941, LAVRENKO 1981), they usually are edificators of extrazonal steppe communities and indicate the genetic link of modern extrazonal steppes of Europe with periglacial. In the postglacial period, migration of steppe plants territories previously occupied by glaciation proceeds. In connection with an increase of xerization of the natural environment in Europe, the formation of secondary steppe communities in the reduced forests and bushes is intensively proceeding.

SUMMARY

Despite of the nearness of geographical position, common natural conditions and similarity of the floristic composition of the steppes of the Volhynia and Lublin uplands the steppe vegetation of these regions has different genesis. Extrazonal steppes of the Volhynia upland are primary. They were formed autochthonously as derivatives of the Neogene pine forests and periglacial steppes of the glaciation period. The steppes of Lublin upland were formed in the course of migration of steppe plants from the side of the Volhynia-Podolia in the post glacial period. Comparison of the Volhynia and Lublin steppes with analogous communities of other regions of Europe does not permit a strict differentiation between western and east-European extrazonal steppes. The presence of relict species of the Neogene forests in composition of the steppe flora of Baden-Württemberg, Volhynia-Podolian and central Russian uplands as well as some other regions of Europe not occupied by glaciation testifies to the autochthonous formation of extrazonal steppes in these regions. These primary steppe communities are those centers from where steppe plants migrated to the adjacent territories occupied in the past with glaciation, thus forming secondary extrazonal steppe communities in corresponding ecotopes.

REFERENCES

ANDRIENKO T.L., 1987: Cretaceous Pine Forest. (In Russian). Perspektivnaya set' zapovednykh obiektov Ukrainy, Naukova dumka, Kiev, 234-236.

AYMONIN G., 1958: Quelques aspects des phytocénoses de *Daphne cneorum* en particulier au Pays basque français. Bull.Centre d'Etude et de Recherches Scientifiques Biarritz, *2(1)*, 51-91.

BARABASH G.I. and GOLITZIN S.V., 1962: Characteristic of grass-bush groups with *Daphne julia* K. - Pol. (In Russian with English summary). Bot.zhurn. *57(12)*, 1806-1811.

DIDUKH Y.P., 1972: New places of occurrence of *Teucrium praemontanum* Klok. (In Ukrainian). Ukrain.bot.zhurn. *29(3)*, 379-381.

DIDUKH Y.P., 1974: Steppe vegetation of the Vishneva Mountain near Rovno. (In Ukrainian). Ukrain.bot.zhurn. *31(3)*, 361-364.

DOROFEEV P.J., 1986: On the late Pliocene flora from the Moiseejevo village in the south of Tambov. (In Russian). Bot.zhurn. *71(1)*, 3-32.

ELLENBERG H., 1986: Vegetation Mitteleuropas mit den Alpen in ökologischer Sicht. Ulmer, Stuttgart. 289 p.

FIJALKOWSKI D., 1972: Geobotanical relations of Lublin area. (In Polish). PWN, Wroclaw, Warszawa, Krakow. 285 p.

GOLITZIN S.V., 1965: "Lowered Alps" and cretaceous sources of the Middle Russian upland. (In Russian). Voronezh. 16 p.

JAKUCZ P., 1961: Die phytoozönologischen Verhältnisse der Flaumeichen Buschwälder Südostmitteleuropas. Akad. Koado, Budapest. 314 p.

KLEOPOV Y.D., 1928: Relics of steppe vegetation in the Cherkassy region. (In Ukrainian). Ochorona pamiyatok prirody na Ukraine *2*, 3-15.

KLEOPOV Y.D., 1933: Residues of steppe vegetation of the Kiev upland. (In Ukrainian). Zhur.bot.tsiklu VUA, *5-6*, 153-156.

KLEOPOV Y.D., 1941: Periglacial steppes of the European part of the USSR. I. Relict chain *Caricion humilis*. (In Russian). Uchenye zapiski Kharkovskogo universiteta *22*, 167-183.

KOCZWARA M., 1925: Floristic borders of Podolia. (In Polish). Kosmos *50*, 1285-1322.

KORNAS J., 1948: Polish species of *Daphne*. (In Polish). Chronmy Przyrode Ojczysta, *4(11/12)*, 7-13.

KOZO-POLANSKY B.M., 1911: Flora of Voronezh gubernia. I. About some new and more rare species for gubernia. (In Russian). Trudy botanicheskogo sada imperatorskogo Yurievskogo universiteta *12(1)*, 22-30.

KOZO-POLANSKY B.M., 1931: In the country of living fossils. Essay of the history of mountain pine forests in the steppe lowland. (In Russian). Uchpedgiz, Moscow. 184 pp.

KUKOVITSA G.S., 1984: Steppe vegetation of the Western Podolia and its protection. (In Russian). Kiev. 16 p.

LAVRENKO E.M., 1980: Eastern European meadow steppe and steppe-like meadows. (In Russian). Rastitel'nost' evropeiskoi chasti SSSR, AN SSSR Publ., Moscow. 220-231.

LAVRENKO E.M., 1981: Vegetation of Pleistocene periglacial steppes of the USSR. (In Russian). Bot.zhurn. *66(3)*, 313-327.

MACKO S., 1937: Vegetation of projected reservations in Volhynia. (In Polish). Ochrona przyrody, 18, 111-185.

MEDWECKA-KORNAS A., 1960: Poland's steppe vegetation and its conservation. State Counc.Conserv. Nature, Krakow. 32 p.

MEDWECKA-KORNAS A. and KORNAS J., 1989a: The steppe reserve "Skorocice" near Busko. Guide to the 19th IPE. The surroundings of Krakow. Krakow. 37-41.

MEDWECKA-KORNAS A. and KORNAS J., 1989b: The steppe reserve "Waly' near Raclawice. Guide to the 19th IPE. 42-44.

MELNIK V.I., 1986: Distribution and modern conditions of *Daphne cneorum* in the Ukraine. (In Russian). Bot.zhurn. *71(1)*, 52-57.

NESHATAEV Y.N. and SOBAKINSKYCH V.D., 1976: The lowered Alps and Thyme community of the western site Barkalovka (Kursk region). (In Russian). Bot.zhurn. *61(4)*, 480-487.

PACZOSKI J., 1891: Concerning Volhynian Flora. A list of plants gathered in 1890 in the Dubno region. (In Polish). Pamietnik Fizjograficzny 2, 67-69.

PACZOSKI J., 1896: Supplement to the list of plants gathered in the Dubno region of Volhynia gubernia. (In Polish). Ilid. *14*, 137-143.

PACZOSKI J., 1899: A list of plants gathered in Podolia, in the Northern Bessarabia and near Zdolbunov in Volhynia. (In Polish). Sprawozdania Komisyi Fizjogr. *34*, 136-175.

PANEK J., 1930: Vegetation of the surroundings of Rowno. (In Polish). Rocznik Wolynski *1*, 57-79.

PANEK J., 1931: Community of steppe cherry tree (*Prunetum fruticosa*) and its succession. (In Polish). Rocznik Wolynski *2*, 403-425.
PANEK J., 1933: Wisniowa Mountain in Volhynia. (In Polish). Ochrona przyrody *13*, 72-78.
PANEK J., 1939: Steppe and rock vegetation of loess Volhynia. (In Polish). Rocznik Wolynski *7*, 26-66.
ROGOVICH A.S., 1869: Review of seed and higher spore plants as a part of composition of flora in gubernias in Kiev training regions: Volhynia, Podolian, Kiev, Chernigov and Poltava. (In Russian). Kiev. 147 pp.
SHELYAG-SOSNKO Y.R. and KUKOVITZYA G.S., 1980: Steppe reserves and monuments of nature. (In Russian). Okrana vazhneishikh botanicheskikh objektov Ukrainy, Belorussii, Moldavii, Naukova dumka, Kiev. 220-235.
SHELYAG-SOSNKO Y.R., ZHIZHIN N.P. and KUKOVITZYA G.S., 1975: Steppe vegetation of Lvov region. (In Ukrainian). Ukrain.bot.zhurn. *32(5)*, 630-638.
SKALO D.J., 1955: About calciophylic nature of the steppe flora of the European part of the USSR. (In Ukrainian). Bot.zhurn.Ukr.SSR Acad. of Sciences *12(2)*, 4-51.
SZAFER W., 1923: Tertiary mountain plants of the Skythian rampart of the Volhynia-Podolian refugium. (In Polish). Acta Soc.Bot.Pol. *6*, 97-119.
SZAFER W., 1930: Mountain element in the flora of lowland part of Poland. (In Polish). Rozprawy Wydzialu Mat.-Przyr.Polskiej Akad.Umiej. *69*, 1-123.
SZAFER W., 1977: Vegetation of the lowland part of Poland. (In Polish). Szata roslinna Polski, PWN, Warszawa, 17-188.
SZAFER W., KULCZNSKI S. and PAWLOWSKI B., 1986: Polish plants. (In Polish). PWN, Warszawa, *1-2*, 1019 p.
VASILCHENKO T.I., 1977: Morphogenesis of *Daphne julia* K. -Pol. (*Thymelaceae*) under the conditions of pasture and reservation. (In Russian). Bot.zhurn. *66(9)*, 1266-1275.
WITSCHEL M., 1980: Xerothermvegetation und alpine Vegetationskomplexe in Südbaden. Beihefte Natursch.u.Landschaftspfl. Baden-Württemberg *17*, 212 p.
WITSCHEL M., 1984: Zur Ökologie, Verbreitung und Vergesellschaftung des Flaumigen Seidelbasts (*Daphne cneorum*) auf der Baar. Ver.Geschichte u. Naturgeschichte der Baar und Donaueschingen *35*, 119-136.
WITSCHEL M. und SEYBOL S., 1986: Zur Ökologie, Verbreitung und Vergesellschaftung von *Daphne cneorum* L. in Baden-Württemberg, unter Berücksichtung der zönologischen Verhältnisse in den anderen Teilarealen. Jh.Ges.Naturkd,Württemberg, *141*, 157-200.
ZAVERUKHA B.V., 1960: Steppe sites of the eastern part of the Volhynian forest-steppe. (In Ukrainian). Ann.Issue of the Ukrainian Bot.Soc. *2*, 39-40.
ZAVERUKHA B.V., 1985: Flora of Volhynia-Podolia and its genesis. (In Russian). Nukova dumka, Kiev. 192 p.
ZHIZHIN M.P. and STOIKO S.M., 1980: Botanical reservations and monuments of nature in the Lviv region. (In Ukrainian). Okhorona prirody Ukrainskikh Karpat ta prileglikh teritorij. Nauk.dumka, Kiev. 194-219.

Address of author: Dr. Victor I. MELNIK
Ukrainian Academy of Sciences
Central Republic Garden
Timiryazev 1
252014 Kiev, Ukraine