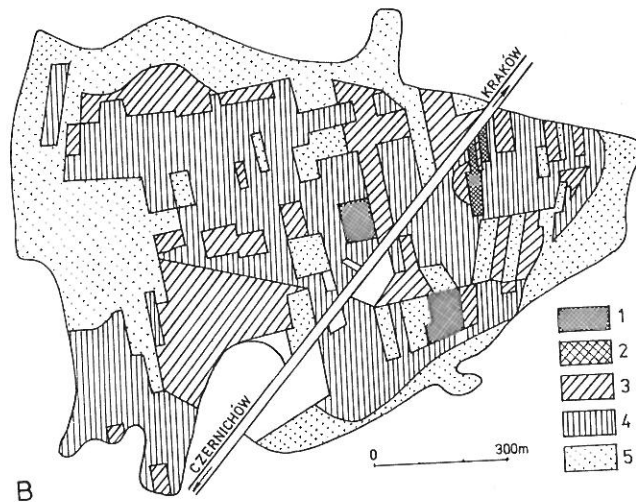


A



B

Fig. 1. The phytosociological map of meadow communities in the environs of Czernichów. A - 1947 (PAWŁOWSKI et al. 1947), B - 1972 (TUMIDAJOWICZ and ZUBEL 1978).
1 - typical *Molinietum coeruleae*, 2 - poorer *Molinietum coeruleae*, 3 - transitional communities from *Molinietum* to *Arrhenatheretum*, 4 - *Arrhenatheretum elatioris*, 5 - arable lands.

The "Skorocice" steppe reserve near Busko (S. Poland)

Anna MEDWECKA-KORNAŚ and Jan KORNAŚ

Miocene gypsum is the most important geological formation in the eastern part of the Nida Basin near the town of Busko (see MEDWECKA-KORNAŚ 1992, General information on the surroundings of Krakow, Fig. 4; this volume). Very interesting landscape forms are connected with this substratum, as well as peculiar rendzina soils with the most extreme xerothermic vegetation. All these elements are particularly well developed in the nature reserve "Skorocice" (7.69 ha), which includes a small ravine located 7 km SW of Busko, 200-220 m a.s.l. There are five other steppe reserves of similar character in the vicinity.

The climate of the region is pronouncedly more continental than in other parts of southern-central Poland (Busko: mean annual temperature 7.8°C, mean annual precipitation 580 mm). Frequent drought periods, averaging four times in ten years, adversely influence the crops.

The landscape around the "Skorocice" reserve is slightly undulating and rather monotonous. The black, humus-rich rendzinas are covered by arable fields, some planted in tobacco. The only variation is provided by gypsum locally cropping out on the surface. The ravine in "Skorocice", only 1850 m long and up to 80 m wide, exhibits an astonishing richness of relief forms: steep, cliff-like rocky walls, isolated hillocks and lateral valleys, all this on a rather small scale. The relative altitudes do not exceed 20 m. The karst phenomena are beautifully developed: sink-holes, caves partly guiding a subterranean rivulet, which forms a vaclusian spring in the lower part of the ravine, a hanging rock bridge, etc. (Fig. 1).



Fig. 1. The "Skorocice" nature reserve - gypsum rocks with xerothermic grassland and mown meadows on the valley floor. Photo by A. Medwecka-Kornas, 1958.

The vegetation of the ravine is extremely variegated (Fig. 2). Eleven plant communities have been recorded, representing xerothermic grasslands (*Festuco-Brometea*), meadows (*Molinio-Arrhenatheretea*), fragments of reed-swamps (*Phragmitetea*), and nitrophilous vegetation, partly natural and part-

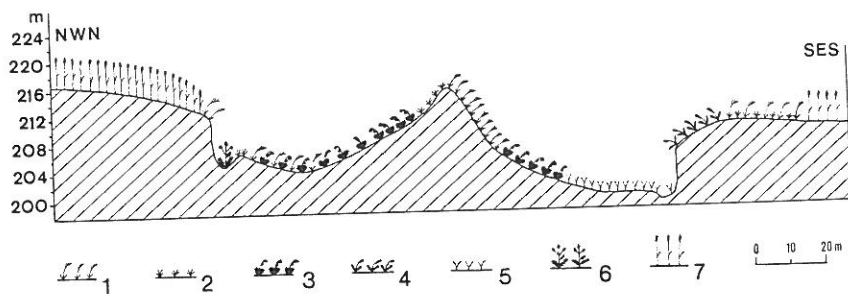


Fig. 2. Distribution of plant communities in the "Skorocice" nature reserve (transect based on the phytosociological map).
1 - *Sisymbrio-Stipetum*, 2 - community of *Festuca rupicola-Koeleria macrantha*, 3 - *Thalicthro-Salvietum*, 4 - *Seslerio-Skorzonetum*, 5 - *Arrhenatheretum elatioris*, 6 - community with *Chaerophyllum bulbosum*, 7 - arable fields.

ly developed in places disturbed by man (*Rudero-Secalietea*).

Steppe grasslands occupy the slopes of the ravine and the crests of the hillocks. On the southern exposed slopes, the "feather-grass steppe" (*Sisymbrio polymorpha-Stipetum capillatae*) can be found, with *Festuca valesiaca*, *Poa bulbosa* f. *vivipara*, *Carex supina*, *Gypsophila fastigiata*, *Hieracium echinodes*, *Oxytropis pilosa*, etc. It occupies the shallowest soils: skeletal rendzinas without a humus layer. Locally, among clusters of grasses and perennial herbs, the gypsum soil appears on the surface. In spring, a number of annuals flower here, e.g. *Arabis recta*, *Medicago minima*, *Veronica praecox*, etc. Xerothermic cryptogams are also present: liverworts, e.g. *Fimbriaria (Asterella) saccata*, fungi, e.g. *Gastrosporium simplex* and lichens. The stands of *Sisymbrio-Stipetum* do not show successional tendencies towards more closed vegetation, e.g. shrub thickets (Fig. 3).

In less exposed places rich stands of the "meadow steppe" (*Thalicthro-Salvietum pratensis*) occur, occupying a large area of the slopes, especially their lower parts. The soil shows a well developed humic horizon, attaining a depth of 1 m or more, with many features of a chernozem. Mesomorphic grasses and sedges (e.g. *Elymus hispidus* = *Agropyron intermedium*, *Bromus inermis*, *Carex praecox*) dominate, along with many colourful forbs such as *Adonis vernalis*, *Campanula bononiensis*, *Eryngium campestre*, *Falcaria*



Fig. 3. Feather-grass steppe (*Sisymbrio-Stipetum*) on gypsum outcrop in the "Skorocice" nature reserve. Photo by A. Medwecka-Kornas, 1958.

vulgaris, *Medicago* (*sativa* ssp.) *falcata*, *Verbascum lychnitis*, as well as the very rare *Ranunculus illyricus*. *Thalictrum-Salvietum* is a seral community which was maintained through occasional grazing. When undisturbed it is liable to a successive invasion of shrubs, as may be seen in some places in the reserve.

On the northern slopes which are comparatively shady and humid, small stands dominated by *Sesleria coerulea* occur (*Scorzonero purpureae-Seslerietum*), with *Asperula tinctoria*, *Thalictrum simplex*, *Viola rupestris*, and the only Polish populations of *Serratula lycopifolia* and *Veronica paniculata* ssp. *foliosa* (KAZMIERCZAKOWA and TRZCINSKA-TACIK 1991).

On the flat areas of ridges, especially in places regularly grazed and more or less trampled, a short grassland of *Festuca rupicola* (= *F. sulcata*) and *Koeleria macrantha* (= *K. gracilis*) persists, with *Astragalus danicus*, *Carex humilis*, *Potentilla cinerea*, *Thymus glabrescens*, *Veronica spicata*, etc.

Thirty years ago this community was more widespread and more typically developed, its stands being regularly grazed and trampled. Later on it retreated markedly because of the regime of strict protection established in the reserve. The floor of the ravine was formerly occupied by rich hay-meadows (*Arrhenatheretum elatioris*) with *Bromus hordaceus*, *Crepis biennis*, *Geranium pratense*, *Pastinaca sativa*, etc. When mowing of these secondary meadows was interrupted (as a protection measure), they were very soon replaced by stands of nitrophilous weeds, above all *Urtica dioica*. Recently, controlled mowing has been reintroduced and the meadow community is beginning to reestablish itself.

Other plant communities cover much smaller areas in the Skorocice Ravine than those already discussed. Along the rivulet and in the ponds fragments of reed-swamp communities appear in which *Scirpus* (*Schoenoplectus*) *tabernaemontani* and *Teucrium scordium* deserve attention. At the transition of the moist meadows to xerothermic grassland, a narrow belt with the halophilous species, *Carex flacca* (= *C. glauca*) and *Tetragonolobus maritimus* (*Lotus siliquosus*), may be found.

In the karst sinkholes a number of nitrophilous herbs occur, e.g. *Chaerophyllum bulbosum* (very abundant), *Ballota nigra*, *Chelidonium majus*, *Leonurus cardiaca*, etc. as well as *Sambucus nigra* among the shrubs. Under overhanging rocks and in shallow caves a community of nitrophilous annuals has been discovered (with *Asperugo procumbens*, *Bromus sterilis*, *Chenopodium hybridum*, *Stellaria media*, etc.). At least some of the weeds in both community types seem to be fully native components of the local flora. On the

contrary, many interesting thermophilous segetal species on arable fields around the reserve (*Adonis aestivalis*, *A. flammeus*, *Anagallis foemina*, *Caulis platycarpus*, *Conringia orientalis*, *Euphorbia falcata*, *Fumaria vaillantii*, *Kickxia spuria*, *Ranunculus arvensis*, *Stachys annua*, etc.) have certainly been introduced by man (in prehistoric times). Most of them became extremely rare or even extinct in the last years, because of improved agricultural practices.

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