

Fauna

The Carpathian (Pannonian) Basin has some of the largest biodiversity of all European regions. Its geographically transitional position has resulted in a mixture of faunal elements, showing a wide variety concerning both origin and geographical history. The hilly areas surrounding the Alföld (Great Hungarian Plain), with their transitional climatic conditions, are populated by numerous, biogeographically important species. The southern, xerothermic slopes and foothills of the Transdanubian and North Hungarian Mountains served as a refuge for thermo-xerophilous elements during several cold and cool-humid climatic phases of

the Quaternary, and as centres of their dispersal. Thus, many thermophilous elements probably populated the Carpathian Basin not only by long-distance colonisation from remote glacial refuges, but also from numerous meso- or microclimatically favourable sites, lying at the fluctuating borderlines of the Mediterranean refugial and periglacial belts. The biostratigraphical structure of the Hungarian late Pleistocene, often characterised by a coexistence of forest and non-forest faunal elements, provides evidence that demonstrates the transitional character of this region throughout the Quaternary.

Endemic Taxa and Autochthonous Evolution in the Carpathian Basin

The Carpathian Basin belongs amongst the geologically youngest areas of Europe. There are, however, some taxonomical groups that are made-up to a considerable degree of endemic species, e.g. the land gastropods, the earthworms or some soil arthropods. Their core areas clearly coincide with the younger Tertiary land masses within and near to the Carpathian Basin. Most endemic species are narrow specialists, inhabiting extreme habitats, such as thermal springs, karstic caves and karstic springs. Several endemic troglobionta have been identified in gastropods, pseudo-scorpions, harvestmen, spiders and springtails, often occurring within a single or in a few caves of karstic mountains. The bulk of these endemic taxa are confined to the Eastern and Southern Carpathians, to the Apușeni Mountains, that were able to preserve some endemic, and also several relict species

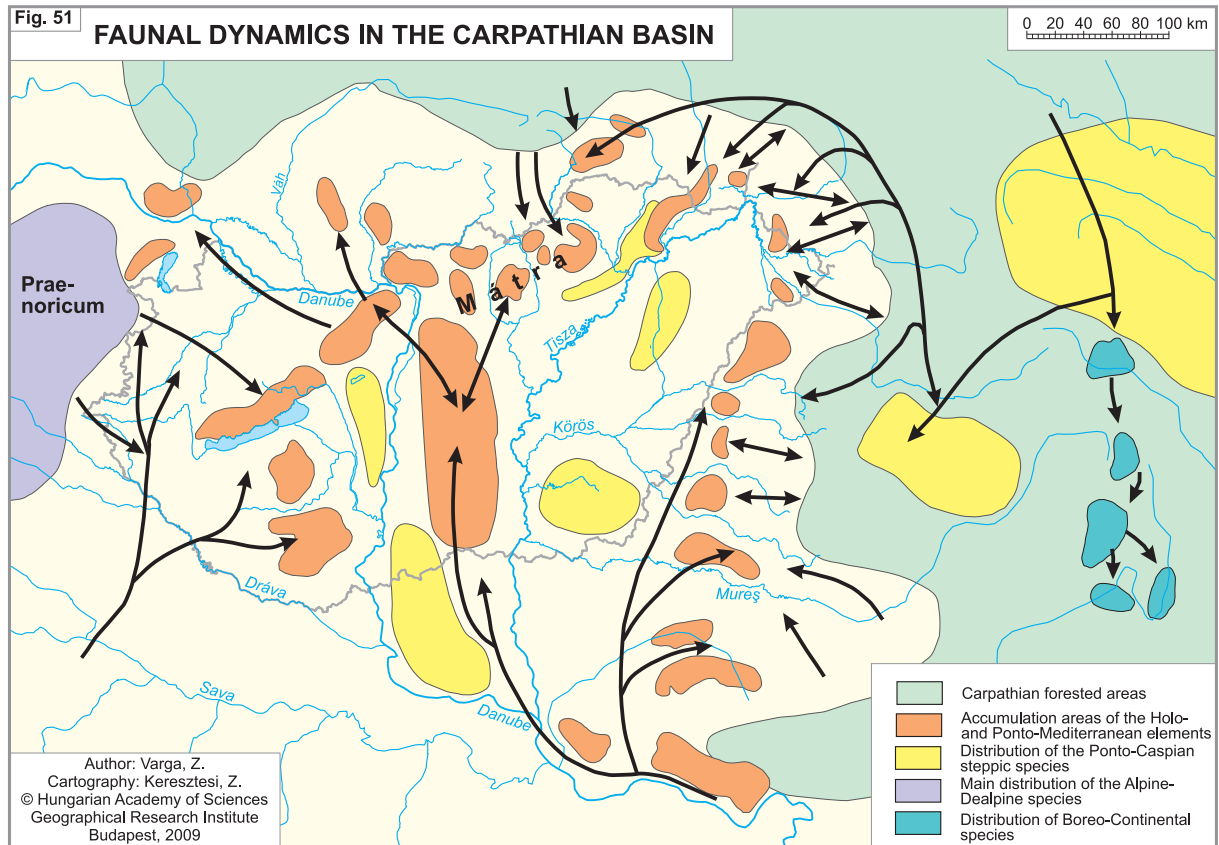
of Isopoda and Diplopoda, in refugia without permafrost phenomena during the last glaciations.

Amongst the more mobile insect groups the proportion of endemism is rather low. Most endemic Lepidoptera of the Carpathian Basin belong to Microlepidoptera, which are strictly specialised to some food plants, living on halophyta in the saline grasslands of the Lake Fertő area, and on the Alföld (Kiskunság/Little Cumania and Hortobágy). However, the majority of endemics in the lower, hilly parts of the Carpathian Basin, represent thermophilous post-(inter?-) glacial relicts with connections to the Balkan Peninsula, Asia Minor or southern Russia. These facts clearly demonstrate that the Carpathians can be considered as a core area for the survival and autochthonous evolution of many Invertebrate groups of limited mobility.

Faunal Elements of the Carpathian Basin

Mediterranean species, as well as Submediterranean and Ponto-Mediterranean elements, occur most-

ly as marginal isolates in the Carpathian Basin (Figure 51). In particular, the island-like hilly re-



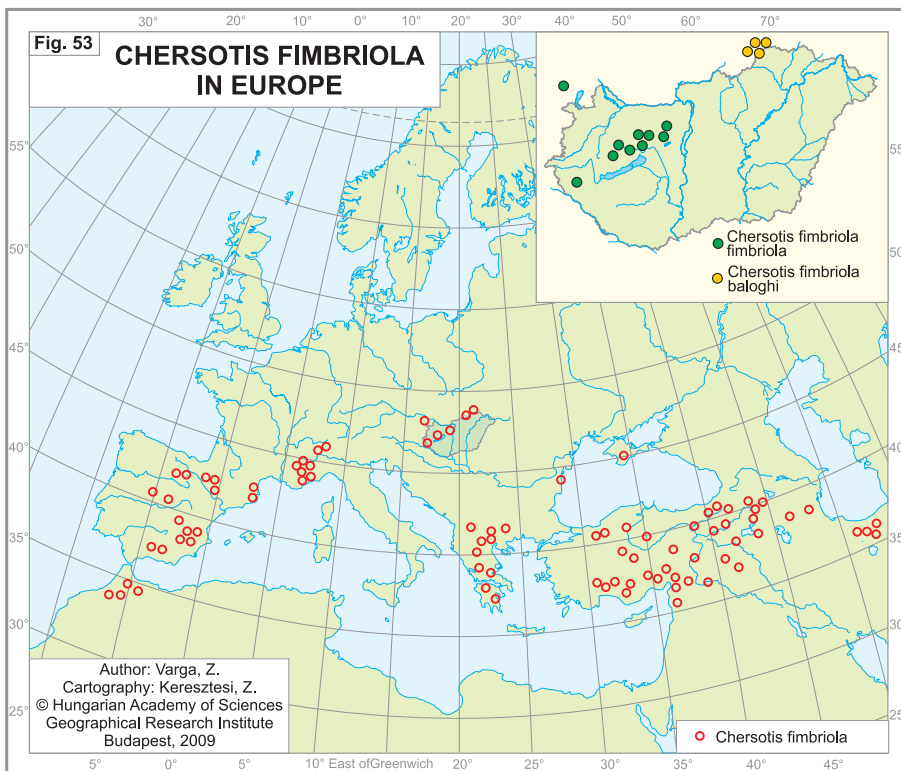
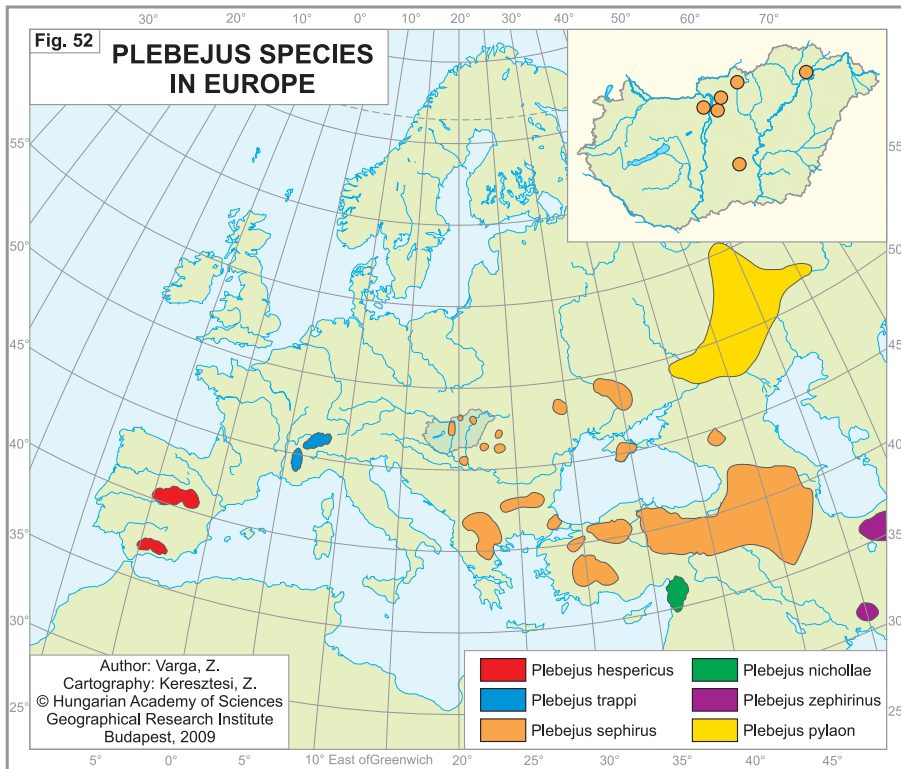
gions of South Transdanubia (Mecsek and Villány Mountains), and the xerothermic lanuginose oak forest and scrub-forest belts of the Transdanubian and North Hungarian Mountains are abundant in such (partly relict-like) elements. The richness of Mediterranean elements found in the calcareous sandy area of Kiskunság can be explained by its favourable meso-climatic character.

The influence of the eastern Balkans becomes apparent along the western border of the Apuseni Mountains and also by the great rivers in the eastern part of the Alföld. The occurrence of some southern elements in the north-eastern part of the Alföld (e.g. Nyírség) can be explained by this dispersal route. Eastern Balkanic influences reach the warm foothill zone of the Transdanubian and North Hungarian Mountains by relict-like occurrences of some Balkanic and Balkanic-Anatolian elements.

Influences of the Ponto-Caspian steppe belts are also characteristic of the Carpathian Basin. Some of their elements are recent invaders, e.g. the butterfly *Colias erate*, dispersed during the last decennia. Other members of this group are threatened by the retreat and fragmentation of the extended grasslands, e.g. the great bustard, *Otis tarda* or the western mole-rat

(*Nannospalax leucodon*) with three kariologically differentiated deme in the Alföld. Typical inhabitants of the steppe grasslands are often restricted to isolated sites of rupicolous and loess grasslands, e.g. the grasshoppers *Stenobothrus eurasius* and *Arcyptera microptera* and the sub-endemic bush-cricket *Isophya costata*. They can be regarded as relicts of the post-glacial steppe period, often corroborated by their geographical isolation, as well as by their taxonomical differentiation, e.g. *Vipera ursinii rakosiensis* or the Zephyr Blue (*Plebejus sephirus*), with isolated colonies in the Carpathian Basin (Figure 52).

Eremic species are restricted to the semi-desert-like habitats of the lowland with extreme edaphic conditions. There are very few vertebrates of this faunal type, e.g. the rodent *Sicista subtilis* and the short-toed lark, *Calandrella brachydactyla*. More examples can be found in phytophagous insects which are connected to halophytic plant communities. They are often represented by endemic Pannonian subspecies or allopatric sibling species of Turanic origin. The dispersal of this species group could have originally taken place in the late glacial (cryoxerotic) phases, with subsequent isolation as a result of the post-glacial expansion of the forest belt.



Last but not least, xeromontane elements are also present in the Carpathian Basin. The first main group is the Mediterranean-xeromontane species, represented by only a few Vertebrates (e.g. *Monticola saxatilis*), but by greater numbers of some insect groups, e.g. Noctuidae (examples of which are species of genera *Euxoa*, *Dichagyris* and *Chersotis*: Figure 53) and Orthoptera (e.g. *Paracaloptenus caloptenoides*). The second main group is the continental xeromontane type, represented by widely distributed Asiatic mountain steppe species and by relicts of the dolomitic rupicolous grasslands (Geometridae: *Phyllometra culminaria*, *Lignyoptera fumidaria*). Some genera, typical for the steppe biome, are probably of xeromontane origin (e.g. Lycaenidae: *Plebejus*, *Polyommatus*; Satyridae: *Chazara*, *Pseudochazara*, *Hyponephele*; Noctuidae: *Euxoa*, *Agrotis*, *Dichagyris*, *Chersotis*, etc.).