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**BIOGEOGRAPHICAL PROBLEMS IN THE ČSSR**

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On profite des connaissances biogéographiques pour découvrir la structure du paysage, pour préciser les limites des unités structurales du paysage. Le climat représente le facteur de haut rang de la différenciation de la végétation. Au bord d'une région climatique, les liaisons des associations végétales avec le climat s'affaiblissent, la différenciation de la végétation devient plus abondante. On peut profiter de plusieurs cartes de la végétation pour l'économie, surtout la carte de la végétation potentielle (1:200 000), les cartes de la limite supérieure de la forêt.

Biogeography in the ČSSR is a young discipline of science, which has not a long-established tradition. It is a science which examines the vegetation and animals as a component of the landscape. The object of its research *the refore* is the landscape. It is a physico-geographical discipline, which lays a stress on the relationships of the vegetation and animals to the remaining components of the landscape.

Biogeography is a border science discipline within the frame of the geography. We divide it into phytogeography and zoogeography. The nearest related non geographical science is the geobotanics, which has considerably developed and as a result of the biogeography development lagging behind, it took over in many countries a substantial part of tasks of the phytogeography. The border partner of the zoogeography in biology should be the geozoology. The gigantic quantity of animal species, substantially greater than that of the vegetal species of a certain area of the land, makes difficult the solution of more complex problems and views on the animals and their communities within the landscape frame. A considerable quantity of animal species, mainly unvertebrates, hinders very much the study of common ecological relationships of animals in a given locality and is the main cause of the zoogeography and geozoology lagging behind. This forces the biogeographers to a closer specialization as phyto- and zoogeographers. Many a time we deal only with the vegetal, or only with the animal component of the landscape, in spite of the fact being convinced of the indispensability to examine them together, as one unit in a given place. The investigation of the vegetation and animals as a component of the landscape requires a solid knowledge not only of the landscape and its individual components, but also of the vegetation and animals, which is an exacting requirement for those

interested in the biogeography. Usually we educate biogeographers from geographers by means of an additional study of required biological disciplines, more rarely from botanists and zoologists by an additional study of the geography.

The vegetation and animals integrate the influence of the remaining components of the landscape. In reflecting the complex influence of factors they become in a considerable measure an indicator of the whole landscape character, mainly when the areas are small where an acute lack especially of climatic data is felt, which can be used well in economic practice (for agriculture, for the formation and protection of environment, for recreation activity, etc., as a whole for an optimum arrangement of the landscape and assurance of a lasting regeneration of basic resources of the geosphere, as a condition for preserving life on the Earth).

The spatial arrangement of biocenoses, their composition and mainly their total ecological character contributes substantially to the knowledge of the landscape ecology, of its potential, to the analysis of the landscape structure, mainly to the delineation of units of the lowest order. By it the biogeography helps the regionalization of the area, the delineation of land units with regard to the special requirements of the national economy in an optimum use of the landscape, mainly its ecological formation, in setting up the landuse plan and in assuring a sound environment.

The relation of vegetation and animals to the other landscape components is very multiform. The influences of integrated landscape components in the biocenosis are frequently of a multiform overlapping, their relationships and mutual dependences are many-sided, so that their deciphering is complicated. The existence, development and character of biocenosis depends on the flow of substances and energy. There results from it that the direct factors are the climatic and soil conditions, the water included. The other factors (geological substratum, relief, above sea level height, slope orientation, etc.) act indirectly through the mentioned directly acting factors. They bring about a change of a larger set of landscape elements, the vegetation and animals included, which is also reflected in the spatial arrangement of organic components of the landscape and some of them become differentiation factors of a higher rank also for the vegetation and animals. An expressive, vertically strong dissected relief (for example, in karst areas), the massiveness and the height of the mountain range, the orographic arrangement with regard to air currents, bringing in rains may cause (dependently mainly on the climatic differentiation) also fundamental changes in the vegetation conditions, become differentiation factors of a high rank, delineating also vast and specific vegetation areas (for ex., the Slovak Karst, the area of the Tatra with the adjoining basins on the southern side).

The climate for the vegetation and animals is a differentiation factor of a high rank. The macroclimate impresses on the vegetation a certain its own character. To it relate as a rule the vegetation communities of a higher rank (formations and higher systematic units). The above sea level height differentiates very significantly the vegetation and animals into vertical formations, however, the macroclimate impresses its style on their content and on their spatial arrangement as a whole (a different style of arrangement, but

also of the content of the landscape organic component are the mountain ranges in the Mediterranean, Atlantic and continental area of Eurasia). The soil conditions, the geological substratum, the orientation and dip of the slope and other factors make themselves felt in a more detailed differentiation of the vegetation and animals as regionalization factors of a lower rank.

In the border strip of a certain climatic area (macroclimatic, mesoclimatic) bounds of the vegetation communities of higher ranks with the climate become more unstable than in places situated deep within a given climatic area. A significance is gained by differentiation factors of a lower rank (substratic-soil conditions, orientation and dip of the slope, etc.). It is why in the border areas the differentiation of the vegetation cover is usually more varied, more complicated, richer. For example, along the periphery of the Danubian Lowland, in the border mountain ranges of the West Carpathians (mainly the Small Carpathians, Považský Inovec, Tribeč and other) there extends a strip of oak and oak-hornbeam forests, belonging substantially to the Carpinion betuli formation (Mayer 1937) Oberdorfer 1953, where in extremely dry and warm places there occur as a rule islets of xerophilous oak forests, belonging to the Eu-Quercion pubescentis Klika 1957 and Quercio-Carpinion Klika 1957 sub-formations. It is a strip of area strongly influenced by the climate of the Danubian Lowland, which makes itself felt mainly by high temperatures and dryness in summer (especially in its second half). It aids the development of oak-hornbeam forests and communities of xerophilous character. It pushes back beech woods (representing the oceanic climate, which avoid the drier and warmer lowlands of the Central Europe as a whole) and other mesophilous communities, requiring an increased humidity of the air. It is just in the border area on the transition of the mentioned oak strip into a continuous complex of beech woods, which are situated deeper in the mountain range, there occurs a richer differentiation of spatial arrangement of the vegetation cover. The orientation and dip of the slope, as well as the substratic-soil conditions make themselves felt here. For ex., in the central part of the Small Carpathians, on the transition of the border strip of oak forests (on the South-Eastern side of the mountain range) into the complex of beech woods situated inside the mountain range we currently find on the crystalline substratum oak forests belonging to the Carpinion betuli (Mayer 1937) Oberdorfer 1953 formation on the southern slopes of the hills, which on their northern slopes make a relatively sudden transition to beech woods, belonging to the Eu-Fagion Oberdorfer 1957 em Tx. 1960 sub-formation. According to the orientation of slopes and the relief there alternate here at short distances communities belonging to the Carpinion betuli (Mayer 1937) Oberdorfer 1953, Quercion robori-patraeae Br.-Bl 1932 (acid oak forests), Eu-Fagion Oberdorfer 1957 em Tx. 1960 (rich beech woods) and Luzulo — Fagion Lohmayer et Tx. in Tx. 1954 formations or sub-formations (acid beech woods of lower positions), though the heights above sea level are approximately similar and the geological substratum is negligibly differentiated (for ex., granodiorite). On the other hand in the depth of the beech wood area (for ex., in the Malá, Veľká Fatra, in the Kremnické mountains and elsewhere) we find in general rich beech woods (Eu-Fagion Oberdorfer 1957 em Tx. 1960) in places with a sufficiently thick layer of fine soil on the southern or northern slopes of varied dip, on a different relief, at

a varied height above sea level and on geological substrata, which differ substantially (for ex., on granites and limestones, or andesites).

A richer differentiation of the vegetation on the border climatic areas corresponds to a weaker tie of the living landscape component with the given climatic system and with an increased sensitivity of vegetal communities and certain plant species with the remaining ecological factors. For ex., the beech (*Fagus sylvatica* L.), or the beech wood on the borders of its extension manifest an increased sensibility to substratic-soil conditions. In the mentioned border strip in the central part of the Small Carpathians, therefore on its lower border, in the vicinity of the Danubian and Záhorská Lowland, it avoids as a rule the acid substrata, meanwhile on limestones it becomes more vital, which can be seen also in the growth and appearance of the trees. On the southern side of the High Tatra and in the adjoining basins, it is rare as a whole and it lacks completely in vast areas, which corresponds with a greater massiveness and height of this part of the Carpathians, evoking certain features of increased continentality (in contrast to normal continentality, corresponding with the distance from the Ocean, it is indicated as a high mountain continentality).

On the northern slopes of the eastern part of the Low Tatra, therefore in the immediate vicinity of the mentioned area, or already on its border the beech, or beech wood are slightly extended and as a whole they link with the carbonate substrata, which signalizes the nearness of climatic conditions, limiting the development of beech woods.

Near the south-eastern border of the Low Beskydes in the immediate vicinity of the East Slovakian Lowland minute rock formations of the inner Klippen belt emerge from the flysch. It is an area of oak-hornbeam forests of the Carpinion betuli (Mayer 1937) Oberdorfer 1953 formation, covering a vast area of the mountain range and passing into the plain. The low hillocks of the limestone klippen, emerging from the flysch are, however, covered with beech woods in the form of islets in oak-hornbeam forests.

Of particular importance for the economic practice are maps which illustrate the spatial arrangement of plants and animals. Recently we have finished the map of the upper timberline. In a substantial part of the West Carpathians it was mapped on the basis of terrain investigations and aerial photographs on scale 1:10 000. It represents a detailed course of the present (empiric) timberline. We have detected also the original height of the upper timberline (mainly climatic), before its lowering by man's activity. This enables its practical reconstruction. We avoid the useless financial losses, caused by tree planting, because reforestation above the climatic timberline (resulting from the ignorance of its altitude) is beforehand condemned to failure. Apart from it tree planting in high altitudes, where the tree finds itself on the border of sheer existence, is unusually complicated and exacting for special reforestation methods, strictly taking into consideration the local conditions of the place. In the ČSSR (but also elsewhere) reforestation was made on areas above the timberline, because deforested smooth and usually stepp slopes, receiving an increased total of rainfalls, provide a space for the occurrence of destructive avalanches, on accelerated erosion and failures in water economy (floods in the lower areas, etc.).

Mainly within the frame of the geobotanical working places, however, in

the mapping took part also the biogeographers, a geobotanical map of the ČSSR on scale 1:200 000 was set up. It is a map of a natural potential vegetation. Part of the map sheets has already been published. In the field it was mapped in documents to 1:50 000, or up to 1:25 000. The mapping units correspond to vegetal communities approx. on the level of sub-formations and formations (to the system of Braun-Blanquet school). The said map provides a quantity of valuable informations for the agriculture, forest economy, but also for other economy branches, for the optimum use and formation of the landscape. The central and the highest part of the West Carpathians possess specific, substantially different communities within the frame of the whole ČSSR, which corresponds with some of the mentioned features of continentality, brought about by the orographic arrangement, by a higher altitude and massiveness of this part of the West Carpathians. From the map we can see and delineate more precisely the considerable influence of the climate of the Danubian Lowland on the border mountain ranges of the West Carpathians. The map can be used, for ex., in localizing the recreation activities. For a rest in nature in early Spring the best suitable are areas where the potential vegetation are communities, belonging to the *Eu-Quercion pubescentis* Klika 1957 sub-formation, for the summer rest on the other hand localities with communities of the *Eu-Fagion Oberdorfer* 1957 em Tx. 1960 sub-formation, etc. Even the composition of plant communities, the presence of certain species mainly relicts (for ex., in wet interdunal depressions — they are relict dunes from the Pleistocene in the Záhorská Lowland, etc.) can be used for the application of knowledge in practice and on their basis delineate quite precisely certain areas.

A biogeographic map of the ČSSR was also set up (J. Raušer, Brno). It illustrates the spatial distribution of the vegetation on the basis of groups of forest types (according to A. Zlatník system) and the occurrence of some groups of animals on the map sheets on scale 1:200 000.

For the economic practice will also serve the sets of maps which will be published (in 1980) within the frame of the Atlas of the SSR. They are maps which provide many data on the plants and animals of Slovakia, as well as various synthetic, applied maps, prepared from a certain aspect, having for aim a special practical use and in which the plants and animals represent an important integrated component.

It is still necessary to prepare the phytogeographical (or vegetation) map of the ČSSR. The present „phytogeographical“ maps of Czechoslovakia, or Slovakia are prepared only on the floristic basis and represent floristical land units. The phytogeographical map must represent the structure of the area from the vegetation conditions view point, from the viewpoint of relationships of the vegetation to the other landscape components. A good basis for it is provided by the geobotanical map of the ČSSR and partly the maps representative of the principal forest trees. There lacks, however, the base map, representing the spatial arrangement of the secondary plant communities, because the phytogeographical map must in a substantial measure take into consideration the real vegetation cover. Difficulties arise from the problems with the creation of the system of secondary communities.

In recent years more and more works have been carried out for the economic practice. The land, mainly its organic component is taken into consi-

deration with the aim to detect the consequences of man's planning intervention in the landscape ecology and measures are suggested also for the optimum arrangement of the landscape organic component. A particularly great emphasis is laid on the evaluation of man's intervention from the view point of fundamental disturbance of the biological equilibrium, the flora and fauna protection, the ensurance of a continuous regeneration of the living component of nature as a fundamental resource of the geosphere and its functions in man's environment. From the said aspects sections of the area were evaluated, through which a West-East highway will pass, mainly of what impact will be its construction and service, optimum localities were found for the disposal of various wastes from towns and factories, ecological conditions of the area were evaluated from the view point of localizing the residential areas and industrial enterprises, from the perspective development plan of certain towns, adjustment of the East Slovakian Lowland, etc. The geography and with it also the biogeography, as well as its other disciplines penetrate the conscience of the citizens by solving the said problems and gain constantly in social seriousness as an important science, proved its vitality.

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#### BIOGEOGRAFICKÉ PROBLÉMY ČSSR

Biogeografia sa v ČSSR vyvíja priaznivo, avšak s výchovou biografov sú značné problémy, pretože okrem základného geografického vzdelania treba ovládať aj viaceré biologické disciplíny. Výsledky biogeografického výskumu sa uplatňujú v teoretickom rozvíjaní geografie, v poznávaní štruktúry krajiny, ako aj v hospodárskej praxi. Organická zložka krajiny bohaté integruje vplyvy ostatných krajinných zložiek a analýza ich vzťahov umožňuje poznať štruktúru krajiny, najmä jej najnižšie systematické jednotky, pomáha jednoduchým, operatívnym spôsobom upresňovať priebeh hraníc. Charakter vegetácie priamo závisí od toku energie a látok, takže klíma a pôdne pomery (vrátane vody) sú priamymi ekologickými činiteľmi. Klíma udáva celkový ráz vegetácií, s ňou úzko súvisí priestorové usporiadanie vyšších fyto-sociologických systematických jednotiek, takže sa stáva diferenciacným činiteľom vysokého rádu. Na hraniciach makroklimatických, resp. mezoklimatických oblastí spomenuté väzby sa zoslabujú, takže nastáva bohatšia a pestrejšia diferenciácia spoločenstiev [príklady sú uvedené v texte]. Z máp, dôležitých pre prax, treba spomenúť najmä geobotanickú mapu ČSSR, biogeografickú mapu ČSSR a mapu hornej hranice lesa. Žiada sa vyhotoviť fyto-geografickú [resp. vegetačnú] mapu ČSSR, ktorá by zachytila štruktúru územia ČSSR z hľadiska vegetačných pomerov, z aspektu vzťahov vegetácie k ostatným krajinným zložkám. Doterajšie „fyto-geografické“ mapy ČSSR, resp. Slovenska zobrazujú floristické územné jednotky. V posledných rokoch čoraz viac sa robia aj biogeografické práce pre prax [bližšie pozri v texte].