GEOGRAFICKÝ ČASOPIS

ROČNÍK 28 1976 ČÍSLO 2

PAVOL PLESNÍK

THE PRESENT STATE AND TASKS OF THE BIOGEOGRAPHY IN THE ČSSR

Pavol Plesník: The Present State and Tasks of the Biogeography in the ČSSR. Geogr. Čas., *28*, 1976, 2; 17 refs.

In the work, we deal with the position of biogeography within the system of sciences as well as with some respective terminological problems. Further, we speak about the most important tasks, which are solved or should be solved by the geographers in the ČSSR. At last, we touch upon the question of investigation methods, especially the need of using mathematical methods.

In the contribution we shall deal with biogeography as a scientific discipline first, then we outline some features of the development and the present state (separately in geography of plants and in geography of animals) in the ČSSR, and at last we touch upon the tasks, outlooks as well as methods of biogeography. For technical reasons, we must limit ourselves more to general aspects and conclusions than to detailed analyses.

Biogeography is a physico-geographical discipline, which is concerned with vegetation and animals. In contrast with allied sciences examining vegetation and animals (botany, zoology and further, especially applied sciences), biogeography examines them as a component of the landscape. According to Schmithüsen (1968, p. 7), the object of the research of the geography of plants (Vegetationsgeographie) are territories, landscapes and their vegetation content. Thus, this scientific discipline is a part of the science of landscape. Of this, also its aims, methods and systematic arrangement arise out.

According to up-to-date usages, biogeography is divided into geography of plants and geography of animals. The latter part of geography is currently named zoogeography. On the other hand, the term „phytogeography" (especially in our literature) is currently used for botanic, above all floristic problems. In our botanic circles, phytogeography is mostly interpreted as a science of the distribution of the species of plants. The „phytogeographical" divisions of our territory (Dostál 1967, Futák 1972 and others) are based on floristic principles. With regard for these facts, we preferred the Slovak term „geografia rastlín" (geography of plants) to „phytogeography" (Plesník 1963, p. 167).

The international terms have a great advantage, if they obtain a footing, because they are intelligible for a vast circle of people on the Earth. In case that the term „phytogeography" will be gradually refined properly, without

a danger of complications and terminological chaos, the mentioned term is suitable for using (in the sense of the geography of plants) also in this country, besides the former, already also with regard to the term „zoogeography" as well as to a shorter form of the term.

Terminological inaccuracies, notions unsuitably used etc. create difficulties and in a successive development, with a rapid accumulation of knowledge, they lead to a chaos at last. Consequently, it is necessary to solve speedily the terminological problems, to place the scientific discipline at its right place in the system of sciences as well as to give it its right name. As to the term, it is to be obvious from the name, what the matter is (Horecký 1956). Under any circumstances, the term cannot be in conflict with the object of research of respective scientific discipline, with its content, and basic problems. The basic science (geography, geology etc.), which represented once a self-contained, single discipline, due to the accumulation of knowledge, had to be dismembered, so that it is represented today by a set of scientific disciplines with a joint object of research. The discipline newly arisen was named, as a rule, in such a way that an adjective, resp. a prefix was added to the original (basic) name (e. g. geography), which determined its aiming in detail (e. g. physical, regional geography, biogeography, pedogeography and so on). If the base of composite word is „geography", it is a geographical scientific discipline. Thus, also the term of phytogeography is unambiguous and the branch belongs to the geographical scientific discipline examining the landscape.

The problems of the individual sciences are very differentiated. In solving the problems, the individual sciences use outcomes of other sciences successively more and more, and thus, the latter become auxiliary sciences for the former (for geography, for instance, geology, pedology, botany, zoology and others). In the border area of sciences, the problems are currently overlapped (Mičian 1969). In such cases misunderstandings occur not once, caused by an improper placing in the system of sciences and using unsuitable terms. In the boundary with a related science, the individual sciences have their own scientific discipline respectively, which is usually in a close contact with a border discipline of the related science. For instance, geography of plants as a geographical discipline borders upon geobotany belonging already to the system of biological sciences. Such a partner of zoogeography should be geozoology (or a biological discipline with a similar name), so far, however, the development of knowledge of animals, especially with regard for a vast number of animal species, did not reach a stage where one could speak so unambiguously of a formed up discipline of science as it is in the case of geobotany.

In connection especially with the formation and preservation of human environment, with rational using the resources of the geosphere as well as with an optimum arrangement of the landscape, ecology puts itself forward strikingly. C. Troll (1963) introduced the term „landscape ecology" (Landschaftsökologie) first time as soon as 1938. This term, resp. a term close to it has obtained a footing in the world's literature. In the works written in English language the term „geoecology" has been used. The word „ecology" was introduced by E. Haeckel (in: Troll 1963) in the sixties of last century and expressed the relation of an organism to an environment. A „Commission on High Altitude Geoecology" has been set up within the International Geographical Union (IGU), several symposia on „geoecology" of high mountain ranges,

resp. of mountain territories were held: in Mexico City in 1966 (Colloquium Geographicum 1968), in Mainz in 1969 (Erdwissenschaftliche Forschung 1972), in Calgary in 1972 (Arctic and Alpine Research 1973). A considerable part of problems in the materials of the symposia mentioned, but also most of other works denoted as geoecological ones, resp. landscape-ecological ones, are of a character of physico-geographical works. To the terminological discrepancies, especially in connection with ecology and landscape, attention was called by several authors (Preobrazhenskiy, Aleksandrova, Armand 1973; Sočava, Krauklis, Snytko 1973, Mičian 1975 and others).

The up-to-date usage of a strict separating of plant geography from the geography of animals is in conflict with the basic concept of biogeography as a synthetizing discipline examining vegetation and animals as a part of the landscape. This unfavourable situation has developed as a consequence of unusually wide sets of problems that the plants and the animals are, and which are very calling for a systematic knowledge and at the same time which are rather remote each from other. Also a general delay of zoogeographical knowledge as well as a shortage of analyses and syntheses of biocenoses (the plant and animal components inclusively) have contributed to such a state, too. Biogeography shall not be only a sum, a mechanical joint of its two basic disciplines, but it has to integrate them. In this sense, it is necessary to support endeavour, for instance that of J. Rauser (1970) to express at the same time the problems of vegetation as well as those of animals in the map.

We shall not deal with the development of biogeography in the ČSSR in detail, and therefore all those eventually interested are referred to my work in the past (Plesník 1963). In the world's literature biogeography shows as an old, at the same time, however, also as a young geographical discipline, which is a consequence of the development of geographical sciences and their research methods.

The old geography used descriptive methods. These were applied also in biogeography. They were successful where they brought basic, primary knowledge of vegetation. Especially in well-developed countries with advanced science as well as in all areas where the vegetation cover has been examined in detail, the descriptive methods did not introduce themselves and together with them also biogeography necrotized. The general, rapid development of knowledge called for solving the relations between vegetation and the other components of the landscape, only already on a level of more thorough and detailed knowledge. Geography, in consequence of out-of-date descriptive methods, was not able to solve the new situation. A part of biogeographical problems have been assumed by geobotany, which developed violently especially by introducing statistical methods in investigating plant communities.

Biogeography as a geographical discipline, in the ČSSR, began to develop after the Second World War. A weight has been put on studying the relations of living components of the landscape to non-living landscape elements. Attainments in bonds, in detailed relations of biocoenoses to the other components of the landscape have been deepened. Biogeography develops both qualitatively and quantitatively. The main emphasis of development of the geography of animals is in Brno, that of the geography of plants in Bratislava.

Of the problems solved, at least some of them sould be mentioned. In the Geographical Institute of the ČSAV in Brno, biogeographical maps of the ČSSR

are worked out. They are based upon Zlatník's (1959) forest types and ocurrence of some animals. Biogeographers take part also in creating a geobotanic map of the ČSSR (1:200 000). A part of its sheets has been published, the others wait to be published. They present potential natural vegetation in the ČSSR (Mikyška et al. 1968). The problem of biogeographical regionalization of the ČSSR, which has not yet been made, relates to a considerable measure to the geobotanic map. The division of the territory of the ČSSR to lower territorial units from the viewpoint of vegetation and animals meets (besides the lack of foundations of animals) especially with the problem of communities in the central part of the West Carpathians, especially in the Tatra and its adjacent areas. These are marked for their more intensive continentality as well as other marks, which results in a differentiation of vegetation fundamentally differing from the other territories of the West Carpathians: beech (*Fagus silvatica* L.) occurs slightly there and in extensive areas it is missing completely; larch (*Larix decidua* MILL.) and pine (Pinus silvestris L.) and also cembra pine (*Pinus cembra* L.) in the area of upper timber-line in the Vysoké Tatry are more frequent. In addition, the normal vertical arrangement of the forest belt is deformed, spruce (*Picea abies* L. (KARST)) dominates here sovereignly and rises from the bottoms of the adjacent basins up to the upper timber-line. Similar peculiarities may be seen also in other high and massive mountain ranges. They connect especially with the position and orographical structure of the mountain range and in each mountain range they are of a special character respectively. It is necessary to examine in detail the vegetation of the mentioned territory, the character of some plant communities as well as their incorporation into a phytosociological system. Obscure are also the boundaries of this territory (especially owing to man's activity) on the passage to the beech area in the west.

Generally, man has strongly influenced vegetation cover also in the ČSSR, which especially on deforested areas has gained a nature fundamentally distinctive from the original one. The secondary communities conditioned by man have arisen, which bear the character of the given country analogically as the original communities, although to a lesser measure. It will be necessary to study their character, development, relation to the original communities and to incorporate them into a system.

Several problems were solved, resp. are solved in connection with the needs of our economy as well as with the preservation and formation of human environment. Almost in the whole West Carpathians the problem of upper timber-line has been solved. Almost in the whole mountain range, man has, as a rule strongly influenced its height and course. To obtain pastures (but also owing to other reasons), he removed dwarf-pine (*Pinus mugo* ssp. *mughus* SCOP. (DOMIN)) and forest growths and strongly lowered the upper timber-line. The smooth, grassed slopes afford suitable conditions for the rise of destructive avalanches and make difficult catching precipitation water, which is shown in great variations of surficial run off and frequently also in floods in lower positions. An accelerated erosion and landscape destruction set on. Therefore, the reforestation in the area of upper timber-line has been started on, first, however, it was necessary to make its theoretical reconstruction, to find its original character and its altitude before deforestation as well as also the processes, which run here, to choose the right afforestation method. Almost

in the whole West Carpathians the upper timber-line has been mapped in 1: 10 000, drawn its present state and made a theoretical reconstruction of the timber-line. For instance, in the Veľká Fatra, which especially with its southern part belongs to the most avalanche-forming teritories in the ČSSR and where in 1924 an avalanche slipped and buried the settlement Rybô under itself and has claimed the most victims in the ČSSR, by means of the reconstruction of timber-line and by rational arrangement of forest growths and pastures the danger of avalanches would be removed to a negligible measure, the accelerated erosion would be stopped, the water retention conditions would be improved, the growing of wood mass would increase, the conditions for winter sports would be substantially improved and the cattle breeding would not suffer fundamentally.

For the needs of tourism we solve the problem of influence of the vegetation cover upon various kinds of recreation activities. Vegetation and animals represent unusually important landscape components, which play a significant role in ecology of man. The drawing of the present state of vegetation as well as the spatial arrangement of potential vegetation makes possible to lay out certain regions, resp. individual areas for the needs of tourism and to use them to optimum measure for the individual kinds of recreation activities (tourism, hunting, rest in nature, collecting mushrooms etc.). For instance, deforested areas, where the potencial vegetation is represented by xerophilous oakwoods *(Eu-Quercion pubescentis* KLIKA 1957) are very suitable for the stay in the nature in early spring, because snow disappears here soon, the surface gets dry quickly and covers itself with a varied and rich herbal growth. For the rest in the nature during hot summer days the places of vegetation of a park landscape are very suitable, where the potential communities are rich beechwoods (Eu-Fagion OBERDORFER 1957 em TX. 1960); on the other hand, little suitable are, for instance, xerophilous, thermophilous and other oakwoods, pinewoods. Similarly, we can lay out areas and mark the track for tourism on foot and other kinds of recreation activities.

Lately a very grave problem emerges, which connects with great interferences of man into the landscape. The organic components of the nature, as a rule, react most sensibly upon the activities of man. Their preservation must be secured only within the landscape complex, by a suitable arrangement of the other landscape components, the preservation of plants and animals proper without regarding the changes of environment, on which they are bound, is not sufficient. It follows that especially in such cases like these we judge vegetation and animals as a component of the landscape, we apply a biogeographical principle, we lay emphasis upon the relations to the other landscape elements to be able to predict the final, general influence evoked by an interference into the landscape being prepared. Lately landscape analyses have been made, inclusively the investigation of vegetation and animals, before the beginning of great works (e. g. the dam on the Danube, the construction of main high way through the ČSSR and others), from the viewpoint of the consequences of work upon the landscape, upon optimum arrangement of human environment. Unfortunately, still even today, especially, however, in the past, unilateral economic aspects introduced themselves, following a momentary financial effect, without regard to the destiny of country, wherewith irreparable damages to our economy and to mankind at all have arisen and still arise. It

is necessary to introduce very consistently the requirement of having made a serious regional analysis before any greater interference with the country. The demands of the society upon living standard increase intensively and the scientific- technical development, which connects with it, interferes especially with natural elements of the landscape sensibly more and more. Thus, the expressed requirement for regional analyses gets urgent more and more for optimum arrangement of the landscape from the viewpoint of regeneration of the natural resources of the geosphere, from the viewpoint of the formation and preservation of human environment, which from the viewpoint of further development and existence of mankind far exceeds the boundaries of states and it is indivisible. The necessity of regional analyses before any greater interference with the landscape should be secured legislatively, and namely in a wide international extension.

Geography based upon the descriptive method has lived an unusually long era and somewhere, especially in teaching in primary and secondary schools, it resists up today. Owing to a stronger emphasis upon the relations between the individual ladscape components as well as upon their mutual conditioning and connectioning resulting in an integral complex representing the landscape, the methods of analysis and synthesis have been deepened substantially in the present geography. The outcomes of investigation, the values reflecting the investigated relations, phenomena and processes have hitherto been expressed by word only, which makes difficult the need strictly to express the obtained values, to handle operatively with them, and at last, this affords greater possibilities of deformations due to the individual interpretation of verbal expression.

The present world's science is generally characterized by a very rapid accumulation of knowledge and by their mutual using. Advantage is in such a scientific discipline that is able to use knowledge as much as possible from other sciences and to bring its own outcomes as much as possible, arranged to such a form, to be utilizable for other scientific disciplines. Such a possibility is given by using modern mathematical methods.

The relations between the landscape components are, it is true, complicated, it is possible, however, to express them accurately and briefly by means of mathematic formulas. Some relations have already been expressed in this way (K r c h o 1973). The mathematical expression of relations in the landscape is utilizable in the calculations by means of computers, which are able to work up a vast number of informations accurately and quickly. In this way, computers can be used not only in working up the informations enabling the knowing of landscape, in other words, enabling the development of own geographical knowledge, but also the development of the geographical knowledge that serve for other, non-geographical sciences, wherewith the utility of geography increases especially for the needs of national economy, for optimum utilization of the landscape from the viewpoint of human environment. In this way, geography will obtain reputation and will penetrate deeper to the social consciousness of people.

The relations of vegetation and animals to the other landscape components are very complicated, which results already from the substance of organic mass. As a rule, they integrate in themselves the relations of other landscape elements and thus, they seem to be the most complicated within the landscape,

especially as to the possibility of their accurate, exact expression. It would not be right to wait up to when the formulated relations between such landscape components, which are integrated in biogeographical relations, are worked up mathematically. In investigating the spacial arrangement of biocoenoses, it is necessary to be aimed at the limiting factors.

As an example, we mention xerothermous oakwoods (*Eu-Quercion pubescentis* KLIKA 1957). The xerothermous oakwoods in Slovakia are bound upon extreme stands of the warmest areas of our territory. Most frequently they occur on sunny, usually abrupt slopes roughly up to 500—600 m a. s. l., on carbonatic substrata with shallow, skeletlike soils, readily getting dry. Most amply they occur in the marginal mountain ranges in close neighbourhood to our lowlands. The decisive factor to exist is the shortage of moisture in summer. The shallow, skeletlike soil with a small moisture capacity in the warm period readily gets dry and under longer lasting rainfallfree period mesophilous elements must recede here. On the deeper soils with a greater moisture capacity as well as on the shallow, skeletlike soils of non-sunny expositions (the other conditions are unchanged) the xerothermous oakwoods recede. Thus, by means of measurements in the vegetation period, it is necessary to find the limiting value of soil moisture in relation to the other factors. These relations can be mathematically formulated, when a considerable part of data (temperatures, precipitation, substratum) can be found also from published materials. The methods based upon concrete measurements, numeric data of the individual landscape components, which express the vegetation relations by means of mathematical formulas may be better applied also in biogeographical investigation than up-to-date statistical methods.

BIBLIOGRAPHY

1. Arctic and Alpine Research, Vol. 5, No 3, Part 2, Univ. of Colorado, 1973. — 2. Colloquium Geographicum, Bd. 9, Geogr. Inst. der Univ. Bonn. Geo-Ecology of the Mountainous Regions of the Tropical Americas (C. Troll). F. Dümmlers Verlag, Bonn 1968. — 3. DOSTÁL, J.: Fytogeografické členění ČSR, Sborník Čs. spol. zeměpisné, *62*, Praha 1967. — 4. Erdwissenschaftliche Forschung, Bd. 4, Akademie der Wissensch. und der Literatur. Geoecology of the High Mountain Regions of Eurasia (C. Troll). F. Steiner Verlag GMBH, Wiesbaden 1972. — 5. FUTÁK, J.: Fytogeografický prehľad Slovenska. In: Slovensko 2. Príroda. Obzor, Bratislava 1972, 431—482. — 6. HORECKÝ, J.: Základy Slovenskej terminológie. Vyd. SAV, Bratislava 1956. — 7. KRCHO, J.: Mathematical Generalisation of Forming Isoline Thematic Maps by Computer Exemplified by Morphometric Analysis of Relief Insolation. Acta geographica UC, Geogr. physica *1*, SPN, Bratislava 1973, 235—426. — 8. MIČIAN, Ľ.: Geografia pôd — jej postavenie, obsah a definícia. Sbor. ČSZ 74, 1, Praha 1969, 49—62. — 9. MIČIAN, Ľ.: O niektorých termínoch a pojmoch používaných pri výskume geografickej krajiny. Geogr. Čas., *27*, 1975, 1, 45—51. — 10. MIKYŠKA, R. a kol.: Geobotanická mapa ČSSR, 1. české země. Academia Praha, 1968, 204 p.

11. PLESNÍK, P.: Geografia rastlín, jej vývoj, súčasný stav a perspektívy. Acta geol. et. geogr. UC, Geographica *3*, 1963, 166—194. — 12. PREOBRAŽENSKIJ, V. S., ALEKSANDROVA, T. D., ARMAND, A. D., MILOVIDOVA, N. V., MUCHINA, L. I., RETEJUM, A. Ju.: K analizu ispoľzovanija terminov i ponjatij geografii. III. meždunarodnyj simpozium, 2. panel. Smolenice (ČSSR) 28. 11. — 1. 12. 1973. — 13. RAUŠER, J.: Biogeografická mapa (1:200 000). List Brno. Vyd. Kartografia Praha, 1970. — 14. SCHMITHÜSEN, J.: Allgemeine Vegetationsgeographie. 3. Aufl., Berlin 1968. — 15. SOČAVA, V. B.,

KRAUKLIS, A. A., SNYTKO, V. A.: Glavnejšie ponjatija, ispoľzuemie pri komplexnych issledovanijach landšafta. III meždunarodnyj simposium, 2. panel. Smolenice (ČSSR) 28. 11. — 1. 12. 1973. — 16. TROLL, C.: Landschaftsökologie als geographisch-synoptische Naturbetrachtung. Einleitungsvortrag beim Internationalen Symposium über Pflanzensoziologie und Landschaftsökologie, 8.—11. April 1963 in Stolzenau/Weser. Erdkundliches Wissen, H. 11, Fr. Steiner Verl. Gmbh. Wiesbaden 1966. — 17. ZLATNÍK, A.: Přehled slovenských lesů podle skupin lesních typů. Spisy Věd. labor. biogeocenologie a typologie lesa. Lesn. fak. VŠZ 3, Brno 1959.

ПАВОЛ ПЛЕСНИК

СОВРЕМЕННОЕ СОСТОЯНИЕ И ЗАДАЧИ БИОГЕОГРАФИИ В ЧССР

Биогеография изучает растительность и мир животных как компонент ландшафта и поэтому она принадлежит к системе географических дисциплин, занимающихся исследованием ландшафта. На практике она все еще чётко разделяется на географию растений и географию животных, причиной чего является в первую очередь отставание зоогеографических сведений и огромное количество видов животных. Несмотря на то, понимаем биогеографию как цельную дисциплину, представляющую собой синтез её приведенных ветвей.

Биогеография в ЧССР лишена традиции. Начало ее развития относится к периоду после 2. мировой войны. Она возникает на остатках традиционной описательной географии. Из числа задач, которые решаются сейчас или которые должны решаться в будущем в ЧССР, приводим здесь по крайней мере некоторые: Географический институт ЧСАН в Брно издает биогеографические ландкарты ЧССР (И. Р а у ш е р). В Словакии была в сущном определена верхняя граница леса (включительно её теоретической реконструкции). Специалисты по биогеографии принимают участь в изготовлении геоботанической карты ЧССР (в масштабе 1:200 000 с учетом потенциальной природной вегетации). Овсуждаются биогеографические проблемы в связи с крупными вмешательствами в ландшафт плотипа с ГЭС па Дунае, постройка главной автострады в ЧССР и др.) из точки зрения жизненной среды и регенерации естественных источников геосферы, оптимального упорядочения ландшафта. Необходимо разрешить проблемы биогеографического расчленения ЧССР и систем секундарных обществ, продвинуть вперед отставшее развитие сведений о животном мире ЧССР. И в биогеографии необходимо перейти на математические методы: отношения растений и животных к другим элементам выражать при помощи математических формул.