EMIL MAZÚR, JÁN URBÁNEK

SEARCH FOR FOUNDATIONS

L'étude présentée veut être une impulsion à la recherche des fondations de la géographie, l'impulsion à son axiomatisation. Elle s'efforce de formuler les hypothèses fondomentales. La première hypothèse est celle sur l'univers géographie. La seconde hypothèse set sur la structure générale de l'univers géographique. La troisième hypothèse est sur la langue, l'hypothèse sur la position clé des conceptions du temps et de l'espace dans l'appareil de la conception de la géographie. Les hypothèses sur le temps et l'espace géographiques partent de la contradiction entre la continuation et la discontinuation. Ces conceptions ensuite sont comme la thèse et l'antithèse transformées en syntaxe dans la forme du système des conceptions contradictoires.

INTRODUCTION

In 1967 was published the book of E. Neff „Die theoretischen Grundlagen der Landschaftslehre" [9]. The author formulated in it three geographical axioms, Planetary Axiom, Chorologic Axiom, Landscape Axiom. It was literally an original exploration deed in geography. However, it was of a surprisingly weak echoism. Even E. Wirth [16] draws the attention to this fact. It is interesting to note that the time conception did not find a place in the axiomatic system of E. Neff. It should probably be the result of certain, traditional philosophic attitudes which do not solely differ, but also isolate and sometimes put almost into contradiction the conceptions of time and space. An example of such an attitude may be the view points of H. Bergson [2]. In the field of geography it was the work of A. Hettner [3], who separated the conceptions of time and space so that the first he added to history, the second to geography. We are of the opinion that the difference between the first and the second axiom is the difference solely in the hierarchy of space, so they could be merged into one axiom. The relationship between the second and the third axiom has tendencies in places to acquire the character of negation: spatial-nonspatial, empty-full. Within such relationships the conception of a landscape space becomes similar to an empty one, absolute space. The third axiom moves then to the first place as a key one.

These short, outlined remarks of criticism are not to depreciate the work of E. Neff. Their objective is contrary. They want to draw the attention to this
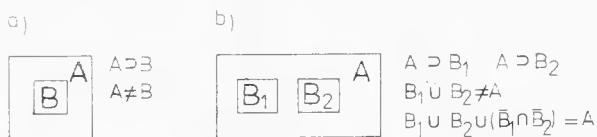
work as a valuable source of suggestions. Definitely they do not want to divert the attention from the principal contribution of the cited work. It is only an experiment to formulate the axioms of geography, but simultaneously an invitation to the axiomatization as a permanent proces in which geography formulates its principles always deeper and more adequately. This requirement is still pressing. Geography has recently known an intense development. An inseparable manifestation of its development is the intense differentiation, spesialization of geography. If this process were not compensated atomization of geography would happen [5]. There would threaten disintegration into isolated disciplines, which would be unified but formally under the title „geographic disciplines". This acute danger can be avoided by formulating principles of geography in drafting the fundamental conceptions and ideas forming the common basis for a varied spectrum of geographic disciplines. However, it is a very difficult task. The axiomatic systems are very rare in empirical sciences and moreover they exist solely in disciplines very distant from the geography (10,17). With regard to these difficulties we do not want and cannot present an adequate and closed system of axioms and theorems in our brief study. This study is intended above all to give impulsion to the axiomatization of geography. It is above all an invitation to geographers to draw the attention in this direction, in which E. Neff had already drawn the attention.

GEOGRAPHICAL UNIVERSE

The geographic universe is defined as that part of the reality, which is studied by geography. The geographical universe one can imagine as a set of points, found on the „Earth's surface" in the form of a multilayer formation. The points are bearers of various properties of relationships and linkages. Geography examines this universe under a certain precondition. The precondition is that this universe is not only differentiated, but that in a certain way it is ordered, organized. The hypothesis of the systems nature of the geographical universe is the „raison d'être" of geography as a science. This hypothesis delineates geography as a special Systemforschung. We will speak of the geographic universe, whose organization has already been determined to a certain measure, as of a landscape.

The mentioned „points" of the geographical universe must not be understood as formations composed of some sort of substance, stuff. They must not be understood as the smallest particles of which the landscape is composed and which could be even found in the landscape and isolated from it in the form of some sort of building stones. These points are abstract entities which, as „bearers of properties" are to facilitate our imagination, thinking and expressing. In this chapter we will try to outline the *abstract structure* which, in the general and at the same time hypothetic position, expresses the way of organization of the geographical universe. We will express this structure in the conceptions of logics set. The first important relationship is that of *inclusion*. For us it is important above all in its *asymetric form*. (Fig. 1). This relationship permits us to define the conceptions „unity" (whole) and „part" [15]. Set A is part of set B. Set B is a unity with regard to set A. After asymetry the second important property is the *transitivity* of inclusion.

This relationship forms the hierarchical structure within which is realized the difference between the unity and the part. The second relationship is that of „junction". Two sets have a junction when there is a third set of which both sets are parts [15]. From the variants of relationship junction we will consider only one (Fig. 1). Even the relationship junction is *transitive.* The hierarchical system takes place on the basis of this property of its (Fig. 2).

a) relationship of inclusion
$$A \supset B \qquad A \neq B$$

b) relationship of junction
$$A \supset B_1 \qquad A \supset B_2$$
$$B_1 \cup B_2 \neq A$$
$$B_1 \cup B_2 \cup (\bar{B}_1 \cap \bar{B}_2) = A$$

Fundamental logical relation
a) relationship of inclusion, b) relationship of junction. A, B, B_1, B_2 sets; $\subset$ relationship of inclusion; $\cup$ relationship of unification; $=$ relationship of equality; $\neq$ relationship of unequality; $-$ relationship of negation; $\cap$ relationship of penetration.
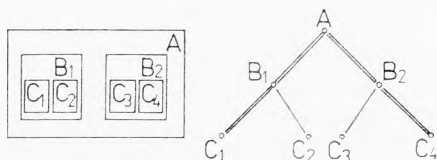
Fig. 1.

Hierarchical system
Letters with indexes indicate sets. Relationships between sets are illustrated in two ways (Euler — Venn diagram and tree diagram).

The difference between the whole and the part is made relative in this system. Each set of system has a double significance. It is a part with regard to the superior set. It is a whole with regard to the inferior set.

The assumption that the organization of the geographical universe can be expressed by means of outlined logical relationships, in one of our fundamental hypotheses.

LANGUAGE

In the introduction we indicated that there exists a certain tendency to separate the conceptions of time and space. This tendency cannot be accepted from the geography stand point. We cannot abandon either of these conceptions, we cannot subordinate either of them to one another. We must understand them as different though equivalent and coherent conceptions. In accepting the unity of time and space we will start from the conception „event", which has an important position in the work of A. N. Whitehead. „Event is specific character of place through a period of time" [15]. We take up again this conception in defining the geographical universe as a certain kind of event. Thus understood universe will appear as a fourdimensional manifoldness, so that its organization can be adequately expressed solely by conceptions of space and time. The hypothesis of the language of

geography, the hypothesis of key position of the conceptions of time and space in the geography conceptional apparatus form another of the foundation stones of our consideration. The conceptions „time" and „space" in the geographical context are linked with the notion of contradiction. It is a contradiction between continuum and its negation discontinuum. These contradictory conceptions have tendency to comport in the form of an alternative — either continuum or discontinuum. In this alternative form they represent a pitfall in which the considerations of time and space may easily become stranded. We will try to show that the contradictory conceptions of continuum and discontinuum are solely apparently alternative, that as a thesis or an antithesis they may be comprised in a synthesis. The outlined general structure can be used as an instrument of synthesis.

TIME

If we consider the geographical universes as an event, we must append to it a certain period of time. It is a period delineated by the origin and destruction of the Earth. From the assumption of the differentiation and organization of the universe it results that the universe changes in this period and that changes are organized. But what is changing in the geographical universe? The points of the universe are abstract entities, which must be imagined as fix, unchanging. That what changes are the properties of the points, as well as the relationships and bonds between them. These changes are organized by general relationships of subsequence and contemporaneity. In a more concrete geographical context, however, the conception of time acquires also the character of contradiction between the continuum and discontinuum. This contradiction will be expressed by conceptions „process" and „state".

P r o c e s s. The process is defined as a continuum, which is open and develops. Continuity means that the sequence of changes is uninterrupted, without stops and steps. The development means that the sequence of changes is oriented towards more perfect states. (the conception of perfection is not defined more closely). From the development there results also the irreversibility of the sequence of changes. Symbolically: $\rightarrow K \rightarrow L \rightarrow M \rightarrow N \rightarrow$. Openness means that the sequence of changes has neither the beginning nor the end. More precisely said, the beginning and the end (origin and destruction of the Earth) are very distant from us, vague.

S t a t e. The state is defined as a discontinuity as negation of the process. We will understand it as a sequence of identical transformations through pass the properties or relationships of points of the geographical universe. Symbolically $M \rightarrow M \rightarrow M$. Non-development of this sequence is evident. Another property of the state is, that it is closed, it has an obvious beginning and end. That means, that it is obviously separated from the preceding and subsequent states forming a sort of environs. Symbolically: $\bar{M} \rightarrow [M \rightarrow M \rightarrow M] \rightarrow \bar{M}$.

H i e r a r c h i c a l   s t r u c t u r e   o f   t i m e. The contradictory conceptions of process and state can be interpreted by the general structure. The relationship of inclusion enable to interprete them as a whole and a part. We will interprete them positively, i. e. the positive conception of process is interpreted as a whole and its negation (state) is interpreted as part of the

whole (Fig. 3 I. interpretation). After such interpretation the process represents *duration* and the state represents *temporariness*.

After the indicated positive interpretation (Fig. 3) the state is connected with the process by the relationship of contemporaneity. It is found „in" or „during" the process. This relationship, however, is not symetrical. After this interpretation the process can be grasped as a *totality* and the state as a relatively *autonomous* part of the totality. The state interpreted thus means a temporary stop of the process, or in a stronger variant the return
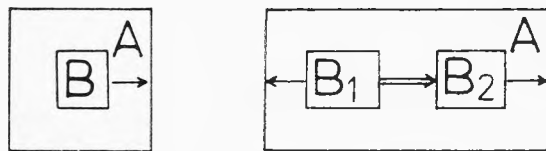

Fig. 2. Interpretation of the hierarchical system

I. interpretation: A — process, totality: B — state, relatively autonomous part; B_1, B_2 — states; $\rightarrow$ relationship of contemporaneity; $\Rightarrow$ irreversible relationship of sequence; $\rightsquigarrow$ positive orientation of the structure, from the superior process to the subordinate state; T — hierarchically the highest formation, totality symbolizing the openness of the structure.

II. interpretation: A — surface, totality; B — area, relatively autonomous part; B_1, B_2 — areas; $\rightarrow$ relationship of comprehensiveness; $\Rightarrow$ symetrical relationship of neighbourhood; $\rightsquigarrow$ positive orientation of the structure from the superior surface to the subordinate area; T — hierarchically the highest formation, totality symbolizing the closeness and limiting of the structure.

III. interpretation: A — sphere, totality; B — layer, relatively autonomous part; B_1, B_2 — layers; $\rightarrow$ relationship of comprehensiveness; $\Rightarrow$ symetrical relationship of neighbourhood; $\rightsquigarrow$ positive orientation of structure from the superior sphere to the subordinate layer; T — hierarchically the highest formation, totality, symbolizing the openness of the structure.

to some of the preceding stages. Symbolically: $K \to L \to M \to M \to N \to O$, or $K \to L \to M \to N \to M \to N \to O$. In the first case one can speak of *equilibrium,* in the second of *cycle.*

The process and the state can be interpreted also by the relationship junction [Fig. 3]. After a positive interpretation the states are interpreted as parts of the process. They are comprised in the same process and as its parts they are *contemporary* with this process. They are mutually connected with the relationship of *subsequence,* they follow each other. It is the consequence

Fig. 3. Centralization of the chronological system.
1 — direction of the irreversible process;
2 — presence as centre, or axis of branching.

$1 - \to$ $2 - ▨$ $o \!=\!=\! o$
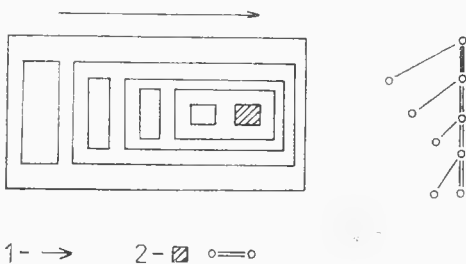
of the process irreversibility, which is superior to them as a whole. The transitivity of the relationship junction enables to interprete the couple process-state as a *hierarchical system* [Fig. 3]. In this system there is contradiction between the totality of process and the state made significantly relative. Each part of the system is interpreted doubly, as a process and as a state. This relativization of contradiction, however, does not mean chaos. On the contrary, the contradiction is *oriented* significantly and explicitly. Each part of the hierarchical system is a state with regard to the superior part. Each part of the hierarchical system, however, is simultaneuosly a process with regard to the inferior parts. This orientation is the result of a positive interpretation of the hierarchical system, according to which the process is at the highest level of the system as a totality. The measure of *contradiction,* however, need not be similar at all the levels of the hierarchical system.

About events related to the geographical universe it is frequently said — it seems, and rightly — that they accelerate (the older events last and the new events begin to take course). The hierarchical structure permits to express this process as a progressive branuching or a progressive centralization in the „direction of time". It is the centralization around one, excentrically placed centre [Fig. 4].

The landscape time in the form of a centralized hierarchical structure of process and state is a structured continuity, or a quasi continuity, a continuity which is temporarily interrupted by states. The time in this conception we will call the *chronological system.* The statement that the landscape time is a chronological system is a further hypothesis.

The outlined notion of time differs from the current notion according to which time is an oriented straight line along which the presence moves, represented by a point. It is nearer to the interesting notions of Bergson [2]. The notion of hierarchically organized events is relatively frequent in pro-

fessional works related to the geographical universe. For lack of space we draw the attention solely to two examples, where this structure is particularly expressive [4,12].

<center>SPACE</center>

The properties of points of the geographical universe change from point to point, from place to place. Likewise the relationships and the bonds between them change equally. We assume that even this kind of changes is organized, i. e. according to the relationships of „neighmourhood" and „inclusion". The sets of universe points organized by these relationships we will call the *landscape space*. We will try to characterize close its organization. In the geographical context the notions of continuity and discontinuity are connected with the conception of space. These seemingly alternative notions, however, do not exlude the possibility of synthesis. As the contradiction equally the synthesis have two various forms in the landscape space. Another form they have in the tangential dimension and another in the radial one of the landscape space. (Both dimensions are determined with regard to the Earth's surface). It is why we will consider separately these dimensions.

The space of the tangential dimension. The contradiction of continuity and discontinuity in the tangential dimension will be expressed in the pair of notions „surface" and „area".

S u r f a c e. The surface is defined as a *continuum*. It means that between the points of universe — in the tangential direction — there are no gaps, no holes. The points adjoin, they touch. They form a continuum in the *topological* sense. If the points are bearers of certain properties, then the surface is a *qualitative continuum.* The properties of surface change from point to point gradually, without steps and faults. There are no boundaries between qualitatively various sets of points. Apart from it the surface can be understood also as an *organizational continuum.* It means that the points of universe in the tangential dimension are connected by a network of bonds so that there is no isolated point or set of points. There are no boundaries here in the function of formations which isolate hermetically the individaul sets of points. The surface as a spatial formation represents a certain kind of a field of force. If we understand the surface as an organizational continuum, it means that the surface is an ordered formation. It is characterized by a certain kind of order. It is the *anisotropy* of the surface. It means that surface has not identical sets of points. A further property of the surface is its evident *closeness.* As the surface is the surface of a sphere it has no boundaries, it is not bordering upon another surface. Finally the surface is explicitly *limited.* Its dimension is given by the Earth's dimension.

A r e a. The area is defined as a negation of surface as a spatial discontinuum. The notion *boundaries* is therefore inseparable from the notion area. The discontinuity of area means that the area as a set of points is bounded in the tangential dimension, that it has a boundary, which separates it from the environs. The boundary has an organizational function, separates, isolates the area from the environs, so that this one represents discontinuity, „hole" with regard to the environs. The boundary may also have a qualitative func-

tion. Then in the form of an alternative, qualitative step it separates area from the environs in the form of a qualitative discontinuity. Finally the boundary can be defined also topologically, as a hole between the area and its environs. With the existence of the boundary and environs of the area relates the *openness* of the area as an antithesis of the surface closeness. The area borders upon another surface — environs.

Hierarchical structure of space in the tangecial dimension.

The contradictory conceptions of surface and area can be interpreted by the general structure. The relationship of *inclusion* permits us to interprete them as a whole and a part. The surface is interpreted as a whole. It is a totality. The area is interpreted as a relative autonomous part of the whole. After this interpretation the relationship of area to the whole can be indicated as an asymetric relationship of „comprehensiveness".

The surface can be interpreted as a whole and the areas as parts of the whole by the relationship *junction*. This interpretation will throw us light on the conception neighbourhood, or boundary. The boundary is the bearer of relationship between areas. It must be described in those conceptions as are described the neighbouring areas, or the whole into which they belong. If the areas are described by properties, then the boundary is a *qualitative* boundary. It is the bearer of differences between the areas. Since the areas are parts of the same whole — qualitative continuity — the boundary cannot be the bearer of the absolute difference. From the whole view point the boundary is the bearer of similarities. It means that the boundary between the areas has a double function. It is the bearer of differences and similarities of the neighbouring areas. Analogically it holds also for the case, when the whole and its parts are desribed by relationships and bonds. Then the boundary is an *organizational* boundary. On the one hand it is the bearer of mutual isolation of autonomous parts and on the other the bearer of their interaction, contact. The transitivity of the relationship junction enables to interprete the pair surface-area in the form of the *hierarchical system* (Fig. 3, II. interpretation). In this system there is contradiction between the surface and the area made relative, ordered and oriented. Each part of the system (except both of the final hierarchical levels) has a *double interpretation*. It is at the same time a totality and an autonmous part. It depends on the stand point from which we interprete it. The contradiction of the surface and of the area is clearly *oriented*. The subordinate part with regard to the superior part is an autonomous area. The superior part is a whole with regard to the subordinate part. The above said interpretation, however, leaves the measure of contradiction undetermined. This measure may fluctuate on the individual boundaries.

The striking characteristic of the tangential dimension is its unequal differentiation. The hierarchical structure permits to express this phenomenon as a progressive branching or centralization into several centres (Fig. 5).

The space of the tangential dimension in the form of hierarchical structure of the surface and of the area is a structured continuity or a quasi continuity. It is a continuity locally interrupted by relative boundaries. Space understood

in this way we will call the *chorological system*. The assumption that the landscape space in the tangential dimension has the character of a chorological system is a further hypothesis.

The notion of space as a hierarchically organized system of areas is current in geography. More frequently, however, such a system is described but formally or qualitatively. More rarely it is described in conceptions of
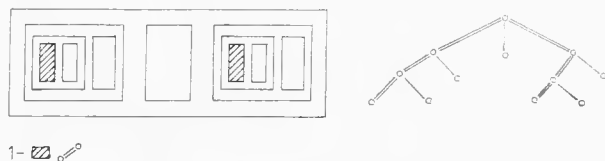
Fig. 5. Centralization of the chorological system.
   1 — centres or axes of branching and centralization.

totality and autonomy, i.e. as a certain kind of organization. The problem of the conception space has been dealt with in our older studies [6, 8, 14].

Space of the radial dimension. The geographical universe — according to the starting assumption — is differentiated and organized also in the radial dimension. Even in this dimension we meet with the conceptions continuum and discontinuum. The contradiction between them we will express in conceptions „sphere" and „layer".

S p h e r e. The sphere is defined as a continuity which is open and anisotropic. This continuity can be understood topologically as a set of points without gaps. It may be understood also as a qualitative continuum — as a gradual change of properties in the radial dierction. Finally it may be understood also as an organizational continuum, as a network of bonds which in the radial direction connect the points of universe so that there are no isolated points. A further property of the sphere is *anisotropy.* It means that in the radial dierection there are no identical sets of points. The sphere is an open continuity. It means that it has a boundary in the radial direction, there exist points above and below it, which belong no longer to the sphere. This boundary, however, is very vague.

L a y e r. The layer is defined as negation of the sphere, as a radial spatial discontinuum. It is a *limited* formation. The boundary has a qualitative function. It limits the layer form its environs — in the from of an alternative qualitative step — either the layer or the environs. The boundary has also the organizational function. It isolates the layer from the environs as a perfectly autonomous formation, which may be understood equally as a closed system. Thanks to the closeness of the layer with regard to the environs, the environs acquires the character of an absolute space.

Hierarchical structure of space in the radial dimension

We can try to make the synthesis of conceptions of the layer and the sphere by the general structure. The relationship of inclusion may be interpreted

solely in the positive sense, i.e. to interprete the sphere as a whole, the layer as a part. The sphere becomes thus a superior formation — a totality with regard to the layer. The layer becomes relatively an autonomous part comprised in the totality. The sphere may be interpreted as a whole and the layer as its part by the relationship junction (Fig. 3, III. interpretation). The boundary between the parts can be interpreted as a formation determined qualita-

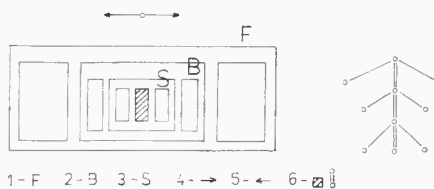1 - F   2 - B   3 - S   4 - →   5 - ←   6 - ▨ ⅃

Fig. 6. Centralization of the synergetic system.
    1 — phenomena of physical nature; 2 — phenomena of biotic nature; 3 — phenomena of social nature; 4 — upward direction; 5 — downward direction; 6 — centres or axes of branching and centralization.

tively and organizationally, analogically as we did it in the tangential dimension. The transitivity of the relationship junction enables to interprete the pair sphere-layer in the form of an hierarchical system (Fig. 3). The contradiction of the sphere and the layer will be made relative and oriented similarly as in the tangential dimension.

The striking feature of the radial dimension is its diferentiated orientation. This one grows in both directions to the Earth's relief. Here, in a small area, there meet phenomena of the anorganic, organic and social nature. Even the complexity of the network of bonds grows qualitatively towards the most differentiated formation. The organization here is the most complicated. The hierarchical structure allows to express this phenomenon as a progressive centralization into one centrally placed centre (Fig. 6).

The radial dimension in the form of centralized structure is the structured continuity. We will call it the *synergetic system,* in linking thus to the notions of J. Schmithüsen, V. Sočava, D. Armand and E. Neff [1, 9, 11, 13]. The nature of this system has been dealt with in an older study underlying mainly the existential nature of some bonds between the totality and the part [7]. The hypothesis in the synergetic system is the last one in our fundamental hypotheses.

CONCLUSION

Hypotheses of the geographical universe, structure and language are abstract hypotheses with a negligible empirical content. Hypotheses on the chronological, chorological and synergetic system have already a richer empirical content. The measure of abstraction decreases from the chronological system to the synergetic system, ,however' it remains still relatively high. Time and two dimensions of the space considered independently are abstract

conceptions. Only when these conceptions will be brought into relationship the landscape will appear as a certain kind of „event". From the connection of the chorological system with the chronological and synergetic system there results that the landscape time will not be simultaneous. It will have a different course in various places in the radial and tangential dimension. The chorological and the synergetic system will become in turn the dynamic formations, their hierarchical structure will be in an incessant but interrupted, reoriented and accelerating movement. From the fundamental hypotheses it is possible to deduce further hypotheses, which will have always a richer empirical content.

REFERENCES

1. ARMAND, D. L.: Nauka o landschafte. Moskva 1975. — 2. BERGSON, H.: Essai sur les données immédiates de la conscience. Paríž 1921. — 3. HETTNER, A.: Die Geographie. Ihre Geschichte, ihr Wesen und ihre Methoden. Breslau 1927. — 4. MAZÚR, E., KALAŠ, L.: Vývoj doliny stredného Váhu v mladom pleistocéne. Geogr. Čas., 15, 2, 1963, 115—132. — 5. MAZÚR, E.: Geography of Today and Its Perpectives. Geogr. Čas., 20, 3, 1983, 201—212. — 6. MAZÚR, E., URBÁNEK, J.: Kategória priestoru v geografii. Geogr. Čas., 34, 4, 1982, 309—326. — 7. MAZÚR, E., DRDOŠ, J., URBÁNEK, J.: Krajinné syntézy — ich východiská a smerovanie. Geogr. Čas., 35, 1, 1983, 3—20. — 8. MAZÚR, E., URBÁNEK, J.: Space in Geography. GeoJournal, 7, 2, 139—143, 1983. — 9. NEEF, E.: Die theoretischen Grundlagen der Landschaftslehre. Gotha-Leipzig 1967. — 10. REICHENBACH, H.: Axiomatik der relativistischen Raum-Zeit Lehre. Braunschweig 1924.

11. SCHMITHÜSEN, J.: Grundlagen der Landschaftskunde. Allgemeine Geosynergetik. Berlin-New York 1976. — 12. SCHUMM, S., A., LICHTÝ, R. W.: Time, Space, and Causality in Geomorphology. Amer. Journal of Science, 263, 1965, 110—119. — 13. SOČAVA, V. B.: Vedenije v učenije o geosystemach. Novosibirsk 1978. — 14. URBÁNEK, J., MAZÚR, E., DRDOŠ, J.: The search for the New Way of the Landscape Study. Geogr. Čas., 32, 2—3, 1980, 108—118. — 15. WHITEHEAD, N. A.: Concept of Nature. Cambridge 1971. — 16. WIRTH, E.: Theoretische Geographie. Stuttgart 1979. — 17. WOODGER, J. H.: The axiomatic method of biology. Cambridge 1937.

Emil M a z ú r, Ján U r b á n e k

HĽADANIE ZÁKLADOV

Geografia sa v súčasnosti prudko rozvíja. Neoddeliteľným prejavom rozvoja geografie je jej intenzívna špecializácia. V prípade, že tento trend nebude kompenzovaný, geografii hrozí atomizácia. Tomuto nebezpečiu sa možno vyhnúť formulovaním princípov geografie, ktoré tvoria spoločný základ pre pestré spektrum geografických disciplín. Predložená štúdia chce dať impulz k hľadaniu základov geografie impulz k jej axiomatizácii, nadväzujúc tak na odkaz E. Neefa. V štúdii sa pokúšame načrtnúť niekoľko základných hypotéz. Prvou je hypotéza, ktorá predpokladá systémový charakter geografického univerza. Druhou je hypotéza o všeobecnej štruktúre geografického univerza. V jazyku formálnej logiky je načrtnutá — vo veľmi zjednodušenej podobe — hypotetická štruktúra geografického univerza. Treťou je hypotéza o jazyku geografie. Táto hypotéza predpokladá, že organizáciu geografického univerza

možno adekvátne vyjadriť iba v pojmoch času a priestoru. Tieto pojmy sú potom koncipované ako protirečenie medzi kontinuom a diskontinuom, ktoré ako téza a antitéza sú potom zjednotené do syntézy. Nástrojom syntézy je všeobecná štruktúra geografického univerza. Hypotéza o geografickom čase vychádza z protirečenia medzi pojmami „proces" a „čas", ktoré však možno zahrnúť do hierarchickej štruktúry — chronologického systému. V geografickom priestore treba rozlíšiť tangenciálnu a radiálnu dimenziu. Pojem priestoru v tangenciálnej dimenzii vychádza z protirečenia medzi „povrchom" a „oblasťou", ktoré je potom zahrnuté do syntézy v podobe hierarchického systému — chronologický systém. Hypotéza o povahe priestoru v radiálnej dimenzii vychádza z protirečivých pojmov „sféra" a „vrstva" zjednotených do hierarchického systému — synergetický systém.

Tri z menovaných hypotéz môžu slúžiť ako východisko pri odvodzovaní ďalších hypotetických výrokov.

Obr. 1. Základné logické vzťahy
   a) Vzťah inklúzie,
   b) vzťah spojenia (junction). A, B, B_1, B_2 množiny; C vzťah inkluzie; U vzťah zjednotenia; = vzťah rovnosti; $\neq$ vzťah nerovnosti; — vzťah negácie; $\cap$ vzťah prieniku.

Obr. 2. Hierarchický systém
   Písmená s indexami označujú množiny. Vzťahy medzi množinami sú znázornené dvoma spôsobmi.

Obr. 3. Interpretácia hierarchického systému
   I. interpretácia:
   A — proces, totalita; B — stav, relatívne autonómna časť; B_1, B_2 — stavy; $\rightarrow$ vzťah súčasnosti: => irreverzibilný vzťah následnosti: $\sim\rightarrow$ pozitívna orientácia štruktúry, od nadradeného procesu k podradenému stavu; T — hierarchický najvyšší útvar, totalita symbolizujúca otvorenosť štruktúry.
   II. interpretácia:
   A — povrch, totalita; B — oblasť, relatívne autonómna časť; B_1, B_2 — oblasti; $\rightarrow$ vzťah obsiahnutosti; => symetrický vzťah susedstva; $\sim\rightarrow$ pozitívna orientácia štruktúry od nadradeného povrchu k podradenej oblasti; I — hierarchický najvyšší útvar, totalita symbolizujúca uzavretosť a limitovanosť štruktúry.
   III. interpretácia:
   A — sféra, totalita; B — vrstva, relatívne autonómna časť; B_1, B_2 — vrstvy; $\rightarrow$ vzťah obsiahnutosti; => symetrický vzťah susedstva; $\sim\rightarrow$ pozitívna orientácia štruktúry od nadradenej sféry k podradenej vrstve; T — hierarchický najväčší útvar, totalita, symbolizujúca otvorenosť štruktúry.

Obr. 4. Centralizácia chronologického systému.
   1 — smer irreverzibilného procesu; 2 — prítomnosť ako centrum, alebo os vetvenia.

Obr. 5. Centralizácia chorologického systému.
   1 — centrá resp. osi vetvenia a centralizácie.

Obr. 6. Centralizácia synergetického systému.
   1 — javy fyzikálnej povahy; 2 — javy biotickej povahy; 3 — javy sociálnej povahy; 4 — smer hore; 5 — smer dole; 6 — centrá resp. osi vetvenia a centralizácie.

Эмиль Мазур, Ян Урбанек

ПОИСК ОСНОВЫ

В настоящее время география отличается бурным развитием. Неотъемлемой чертой развития географии является ее интенсивная специализация. Если эта тенденция не будет компенсирована, географии угрожает атомизация. Эту опасность можно избежать путем формулирования принципов географии, создающих общую основу для пестрого разнообразия географических дисциплин. В настоящей статье мы хотели бы дать импульс к поиску основ географии, импульс к ее аксиоматизации, продолжая таким образом наследство Э. Неефа. В статье мы пытаемся выдвинуть несколько основных гипотез. Первой является гипотеза, предполагающая системный характер географического универсума. Второй является гипотеза о всеобщей структуре географического универсума. На языке формальной логики сделан ее набросок — в очень упрощенном виде — как гипотетической структуры географического универсума. Третья гипотеза — о языке географии. На основании этой гипотезы предполагается, что организацию географического универсума можно адекватно выразить лишь в понятиях времени и пространства. Эти понятия затем построены как противоречия между континуумом и дисконтинуумом, которые как тезис и антитезис затем объединены в синтез. Орудием синтеза является всеобщая структура географического универсума. Гипотеза о географическом времени исходит из противоречия между понятиями „процесс" и „время", которые, однако, можно включить в иерархическую структуру — в хронологическую систему. В географическом пространстве необходимо различать тангенциальную и радиальную размерности. Понятие пространства в тангенциальной размерности основывается на противоречии между „поверхностью" и „областью", которое затем включено в синтез в виде иерархической системы — хорологической системы. Гипотеза о характере пространства в радиальной размерности основывается на противоречивых понятиях „сфера" и „слой", объединенных в иерархическую систему — в синергическую систему. Три из в последнюю очередь упомянутых гипотез могут послужить началом для формулирования дальнейших гипотетических высказываний.

Рис. 1. Основные логические отношения.
а) отношение инклюзии, б) отношение соединения (юнкции), A, B, B_1, B_2 — множества; $\subset$ отношение инклюзии; $\cup$ отношение объединения; $=$ отношение равенства; $\neq$ отношение неравенства; — отношение негации; $\cap$ отношение пересечения.

Рис. 2. Иерархическая система.

Рис. 3. Интерпретация иерархической системы.
1. интерпретация:
A — процесс, тотальность; B — состояние, относительно автономная составная часть; B_1, B_2 — состояния; $\rightarrow$ отношение одновременности; $\Rightarrow$ необратимое отношение последовательности; $\sim>$ положительная ориентировка структуры от вышестоящего процесса к нижестоящему состоянию; T — иерархически самое высокое образование, тотальность, символизирующая открытость структуры,
2. интерпретация:
A — поверхность, тотальность; B — область, относительно автономная составная часть; B_1, B_2 — области; $\rightarrow$ отношение охвата, содержания; $\Rightarrow$ симметрическое отношение соседства; $\sim>$ положительная ориентировка структуры от вышестоящей поверхности к нижестоящей области; T — иерархически самое высокое образование, тотальность, символизирующая замкнутость и ограниченность структуры,
3. интерпретация:
A — сфера, тотальность; B — слой, относительно автономная составная часть; B_1, B_2 — слои; $\rightarrow$ отношение охвата, содержания; $\Rightarrow$ симметрическое отношение

соседства; ~> положительная ориентировка структуры от вышестоящей сферы к нижестоящему слою; T — иерархически самое высокое образование, тотальность, символизирующая открытость структуры.

Рис. 4. Централизация хронологической системы.
  1 — направление необратимости процесса; 2 — присутствие как центр или как ось разветвления.

Рис. 5. Централизация хорологической системы.
  1 — центры или же оси разветвления и централизации.

Рис. 6. Централизация синергической системы.
  1 — явления физического характера; 2 — явления биотического характера; 3 — явления социального характера; 4 — направление вверх; 5 — направление вниз; 6 — центры или же оси разветвления и централизации.

Перевод: Л. Правдова