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The Morphology of Landscape

Diverse opinions regarding the nature of geography are still common. The label geography, as that of history, is no trustworthy indication as to the matter contained. As long as geographers disagree as to their subject it will be necessary, through repeated definition, to seek common ground upon which a general position may be established. In this country a fairly coherent series of viewpoints has been advanced, especially through presidential addresses before the Association of American Geographers, which may be accepted as mirror and mould of geographic opinion in America. They are sufficiently clear and well known that they need not be restated.¹ In European geography a somewhat different orientation appears to be developing. In various quarters significant activity is being displayed, probably in some measure influenced by anti-intellectualist currents. At any rate a shaking up of some vigor is under way. It may therefore be appropriate to re-examine the field of geography, keeping current views abroad especially in mind, in order to attempt a working hypothesis that may serve to illuminate in some degree both the nature of the objective and the problem of systematic method.

THE FIELD OF GEOGRAPHY

The phenomenologic view of science.—All science may be regarded as phenomenology,² the term "science" being used in the sense of or-

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¹ In particular, the following addresses are notable expressions of leading opinion: W. M. Davis, An Inductive Study of the Content of Geography, Bull. Amer. Geogr. Soc., Vol. 38, 1906, pp. 67–84; N. M. Fenneman, The Circumference of Geography, Annals Assoc. Amer. Geographers, Vol. 9, 1919, pp. 3–12; H. H. Barrows, Geography as Human Ecology, *ibid.*, Vol. 13, 1923, pp. 1–14.

² Hermann Graf Keyserling, *Prolegomena zur Naturphilosophie* (München, 1910), p. II.

ganized process of acquiring knowledge rather than in the common restricted meaning of a unified body of physical law. Every field of knowledge is characterized by its declared preoccupation with a certain group of phenomena, which it undertakes to identify and order according to their relations. These facts are assembled with increasing knowledge of their connection; the attention to their connection denotes scientific approach. "A fact is first determined when it is recognized as to limits and qualities, and it is understood when it is viewed in its relations. Out of this follows the necessity of predetermined modes of inquiry and of the creation of a system that makes clear the relation of the phenomena. . . . Every individual science is naïve as a special discipline, in so far as it accepts the section of reality that is its field *tel quel* and does not question its position in the general scene of nature; within these limits, however, it proceeds critically, since it undertakes to determine the connection of the phenomena and their order."³ According to such definition of the grounds of knowledge, the first concern is with the phenomena that constitute the "section of reality" which is occupied by geography, the next with the method of determining their connection.

Geography as a "naïvely given section of reality."—Disagreement as to the content of geography is so great that three distinct fields of inquiry are usually designated as geography: (1) The study of the earth as the medium of physical processes, or the geophysical part of cosmologic science; (2) the study of life forms as subject to their physical environment, or a part of biophysics dealing with tropisms; and (3) the study of the areal or habitat differentiation of the earth, or chorology. In these three fields there is partial accordance of phenomena, but little of relation. One may choose among the three; they may hardly be consolidated into one discipline.

The great fields of knowledge exist because they are universally recognized as being concerned with great categories of phenomena. The experience of mankind, not the inquiry of the specialist, has made the primary subdivisions of knowledge. Botany is the study of plants, and geology that of rocks, because these categories of fact are evident to all intelligence that has concerned itself with the observation of nature. In the same sense, area or landscape is the field of geography, because it is a naïvely given, important section of reality, not a sophisticated thesis. Geography assumes the responsibility for the study of areas because there exists a common curiosity about that subject. The fact that every school child knows that geography

³ *Ibid.*, pp. 8, 11.

provides information about different countries is enough to establish the validity of such a definition.

No other subject has pre-empted the study of area. Others, such as historians and geologists, may concern themselves with areal phenomena, but in that case they are avowedly using geographic facts for their own ends. If one were to establish a different discipline under the name of geography, the interest in the study of areas would not be destroyed thereby. The subject existed long before the name was coined. The literature of geography in the sense of chorology begins with parts of the earliest sagas and myths, vivid as they are with the sense of place and of man's contest with nature. The most precise expression of geographic knowledge is found in the map, an immemorial symbol. The Greeks wrote geographic accounts under such designations as *periplus*, *periodos*, and *periegesis* long before the name geography was used. Yet even the present name is more than two thousand years old. Geographic treatises appear in numbers among the earliest printed books. Explorations have been the dramatic reconnaissances of geography. The great geographic societies justly have accorded a place of honor to explorers. "Hic et ubique" is the device under which geography has stood always. The universality and persistence of the chorologic interest and the priority of claim that geography has to this field are the evidences on which the case for the popular definition may rest.

We may therefore be content with the simple connotation of the Greek word which the subject uses as its name, and which means most properly areal knowledge. The Germans have translated it as *Landschaftskunde* or *Länderkunde*, the knowledge of landscape or of lands. Their other term, *Erdkunde*, the science of the earth in general, is falling rapidly into disuse.

The thought of a general earth science is impossible of realization; geography can be an independent science only as chorology; that is, as knowledge of the varying expression of the different parts of the earth's surface. It is, in the first place, the study of lands; general geography is not general earth science; rather, it presupposes the general properties and processes of the earth, or accepts them from other sciences; for its own part it is oriented about their varying areal expression.⁴

With this preference of synthetic areal knowledge to general earth science the entire tradition of geography is an agreement.

The interdependence of areal phenomena.—Probably not even the adherents of other, recent schools of geography would deny

⁴ Alfred Hettner, *Methodische Zeit- und Streitfragen, Geogr. Ztschr.*, Vol. 29, 1923, pp. 37-59. Reference to p. 37.

place for such a view of the subject, but they deem this naïvely given body of facts inadequate to establish a science, or at most would consider it an auxiliary discipline which compiles fragmentary evidence, to find its place ultimately in a general geophysical or biophysical system. The argument then is shifted from the phenomenal content to the nature of the connection of the phenomena. We assert the place for a science that finds its entire field in the landscape on the basis of the significant reality of chorologic relation. The phenomena that make up an area are not simply assorted but are associated, or interdependent. To discover this areal "connection of the phenomena and their order" is a scientific task, according to our position the only one to which geography should devote its energies. The position falls only if the nonreality of area be shown. The competence to arrive at orderly conclusions is not affected in this case by the question of coherence or incoherence of the data, for their characteristic association, as we find them in the area, is an expression of coherence. The element of time is admittedly present in the association of geographic facts, which are thereby in large part nonrecurrent. This temporal quality, however, places them beyond the reach of scientific inquiry only in a very narrow sense, for time as a factor has a well-recognized place in many scientific fields, where time is not simply a term for some identifiable causal relation.

Historical development of chorologic relation into scientific system.—The older geography was troubled but little by critique. It was casually, even trivially, descriptive rather than critical. Yet though it is idle to seek in most of this literature a "system which makes clear the relation of the phenomena," we cannot dispose of all of it as accidental or haphazard in content. In some measure the notion of areal interdependence of phenomena as giving rise to areal reality was present, as any reader of Herodotus or Polybius knows. The *historia* of the Greeks, with its blurred feeling for time relations, had a somewhat superior appreciation of areal relations and represented a far from contemptible start in geography.⁵ However much it may have been embroidered by geophysical, geodetic, and geologic notes, classical geography in general, not cosmology subsequently interpreted by some as geography, gave primary emphasis to areal description, with frequent observations on the interrelation

⁵ Alexander von Humboldt, *Kosmos*, Vol. I (Stuttgart & Tübingen, 1845), pp. 64–65: "In classical antiquity the earliest historians made little attempt to separate the description of lands from the narration of events the scene of which was in the areas described. For a long time physical geography and history appear attractively intermingled."

of areal facts. The culminating school, of which Strabo was chief, was by no means entirely naïve, and rejected vigorously other definition of geography than as chorology, with express exclusion of cosmologic philosophy.

During the period of great discoveries a bona fide but uncritical geography attained its greatest development in the numerous travel relations and especially in the cosmographies of that time. An ever-increasing body of facts about countries was at that time being brought before the Western world, which took keen interest in the rapidly widening horizon. With such a deluge of newly acquired facts about parts of the world, attempts at systematic ordering were numerous, but often grotesque rather than successful. It is not surprising that dynamic systems of geography should have emerged only as the furor of exploration became spent. Yet it is perhaps even more difficult for us to judge the thought of this period than that of classical antiquity. Yule has helped us to better appreciation of the geographic acumen of some of the men of this period. Of the cosmographers, at least Varenius has been accorded a higher rank than that of a compiler. One very great step in synthesis certainly took place at this time, that of the development of cartography into a real chorologic discipline. Only through a large amount of classification and generalization of geographic data was it possible to consolidate the scattered and voluminous data of exploration into the geographically adequate maps that characterize the latter part of the period. To this day many of the maps of the seventeenth and eighteenth centuries are in some respects monumental. However much may have been added since in precision of measurement, in many ways we have retained the chorologic content as formulated in the maps of this period beginning the "Age of Surveys."⁶ "Every map which reproduces the form of the earth's surface is a kind of morphologic representation."⁷ Not only for physical morphology, but also for the cultural expression of landscape, these maps represented a highly successful series of solutions that are still used. Without such a preliminary synthesis of the facts of geography the work of the next period would have been impossible.

In the nineteenth century the contest between the cosmologic and the chorologic views became acute and the situation of geography was much in doubt. Rationalism and positivism dominated the work

⁶ Oscar Peschel's *Zeitalter der Messungen: Geschichte der Erdkunde bis auf A. v. Humboldt und Carl Ritter* (München, 1865), pp. 404–694.

⁷ Albrecht Penck, *Morphologie der Erdoberfläche*, Vol. I (Stuttgart, 1894), p. 2.

of geographers. The milieu became a leading doctrine and thus continued through the century. Divine law was transposed into natural law, and for geography Montesquieu and Buckle were prophets of major importance. Since natural law was omnipotent the slow marshaling of the phenomena of area became too tedious a task for eager adherents of the faith of causation. The areal complex was simplified by selecting certain qualities, such as climate, relief, or drainage, and examining them as cause or effect. Viewed as end products, each of these classes of facts could be referred back fairly well to the laws of physics. Viewed as agents, the physical properties of the earth, such as climate in particular with Montesquieu, became adequate principles for explaining the nature and distribution of organic life. The complex reality of areal association was sacrificed in either case to a rigorous dogma of materialistic cosmology, most notably in American physiography and anthropogeography. About twenty years ago the most distinguished American geographer took the position "that neither the inorganic nor the organic elements which enter into geographical relations are by themselves of a completely geographic quality; they gain that quality only when two or more of them are coupled in a relation of cause and effect, at least one element in the chain of causation being organic and one inorganic. . . . Any statement is of geographical quality if it contains a reasonable relation between some inorganic element of the earth, acting as a control, and some element of organic existence . . . serving as a response." Indeed in this causal relation was, he said, "the most definite, if not the only unifying principle that I can find in geography."⁸ Cause was a confident and alluring word, and causal geography had its day. The *Zeitgeist* was distinctly unfavorable to those geographers who thought that the subject was in no wise committed to a rigidly deterministic formula.

Latterly, Vidal de la Blache in France, Hettner, Passarge, and Krebs in Germany, and others have been reasserting more and more the classical tradition of geography as chorologic relation. It may be said that, after a period in which special, essentially physical disciplines were most in vogue, we are in process of returning to our permanent task and that this readjustment is responsible for the current activity of inquiry as to content of our field.

Summary of the objective of geography.—The task of geography is conceived as the establishment of a critical system which embraces the phenomenology of landscape, in order to grasp in all of its meaning and color the varied terrestrial scene. Indirectly Vidal de la

⁸ W. M. Davis, *op. cit.*, pp. 73, 71.

Blache has stated this position by cautioning against considering "the earth as 'the scene on which the activity of man unfolds itself,' without reflecting that this scene is itself living."⁹ It includes the works of man as an integral expression of the scene. This position is derived from Herodotus rather than from Thales. Modern geography is the modern expression of the most ancient geography.

The objects which exist together in the landscape exist in interrelation. We assert that they constitute a reality as a whole that is not expressed by a consideration of the constituent parts separately, that area has form, structure, and function, and hence position in a system, and that it is subject to development, change, and completion. Without this view of areal reality and relation, there exist only special disciplines, not geography as generally understood. The situation is analogous to that of history, which may be divided among economics, government, sociology, and so on; but when this is done the result is not history.

THE CONTENT OF LANDSCAPE

Definition of landscape.—The term "landscape" is proposed to denote the unit concept of geography, to characterize the peculiarly geographic association of facts. Equivalent terms in a sense are "area" and "region." Area is of course a general term, not distinctively geographic. Region has come to imply, to some geographers at least, an order of magnitude. Landscape is the English equivalent of the term German geographers are using largely, and strictly has the same meaning: a land shape, in which the process of shaping is by no means thought of as simply physical. It may be defined, therefore, as an area made up of a distinct association of forms, both physical and cultural.¹⁰

The facts of geography are place facts; their association gives rise to the concept of landscape. Similarly, the facts of history are time facts; their association gives rise to the concept of period. By definition the landscape has identity that is based on recognizable constitution, limits, and generic relation to other landscapes, which constitute a general system. Its structure and function are deter-

⁹ P. Vidal de la Blache, *Principes de géographie humaine* (Paris, 1922), p. 6.

¹⁰ J. Sölch, *Die Auffassung der "natürlichen Grenzen" in der wissenschaftlichen Geographie* (Innsbruck, 1924), has proposed the term "Chore" to designate the same idea.

mined by integrant, dependent forms. The landscape is considered, therefore, in a sense as having an organic quality. We may follow Bluntschli in saying that one has not fully understood the nature of an area until one "has learned to see it as an organic unit, to comprehend land and life in terms of each other."¹¹ It has seemed desirable to introduce this point prior to its elaboration because it is very different from the unit concept of physical process of the physiographer or of environmental influence of the anthropogeographer of the school of Ratzel. The mechanics of glacial erosion, the climatic correlation of energy, and the form content of an areal habitat are three different things.

Landscape has generic meaning.—In the sense here used, landscape is not simply an actual scene viewed by an observer. The geographic landscape is a generalization derived from the observation of individual scenes. Croce's remark that "the geographer who is describing a landscape has the same task as a landscape painter"¹² has therefore only limited validity. The geographer may describe the individual landscape as a type or possibly as a variant from type, but always he has in mind the generic, and proceeds by comparison.

An ordered presentation of the landscapes of the earth is a formidable undertaking. Beginning with infinite diversity, salient and related features are selected in order to establish the character of the landscape and to place it in a system. Yet generic quality is nonexistent in the sense of the biologic world. Every landscape has individuality as well as relation to other landscapes, and the same is true of the forms that make it up. No valley is quite like any other valley; no city the exact replica of some other city. In so far as these qualities remain completely unrelated they are beyond the reach of systematic treatment, beyond that organized knowledge that we call science. "No science can rest at the level of mere perception. . . . The so-called descriptive natural sciences, zoology and botany, do not remain content to regard the singular, they raise themselves to concepts of species, genus, family, order, class, type."¹³ "There is no idiographic science, that is, one that described the individual merely as such. Geography was formerly idiographic; it has long since attempted to become nomothetic, and no geographer

¹¹ Hans Bluntschli, *Die Amazonasniederung als harmonischer Organismus*, *Geogr. Ztsch.*, Vol. 27, 1921, pp. 49-68.

¹² Quoted by Paul Barth, *Die Philosophie der Geschichte als Soziologie*, 2nd ed., Part I (Leipzig, 1915), p. 10.

¹³ *Ibid.*, p. 11.

would hold it at its previous level."¹⁴ Whatever opinion one may hold about natural law, or nomothetic, general, or causal relation, a definition of landscape as singular, unorganized, or unrelated has no scientific value.

Element of personal judgment in the selection of content.—It is true that in the selection of the generic characteristics of landscape the geographer is guided only by his own judgment that they are characteristic, that is, repeating; that they are arranged into a pattern, or have structural quality, and that the landscape accurately belongs to a specific group in the general series of landscapes. Croce objects to a science of history on the ground that history is without logical criteria: "The criterion is the choice itself, conditioned, like every economic art, by knowledge of the actual situation. This selection is certainly conducted with intelligence, but not with the application of a philosophic criterion, and is justified only in and by itself. For this reason we speak of the fine tact, or scent, or instinct of the learned man."¹⁵ A similar objection is sometimes urged against the scientific competence of geography, because it is unable to establish complete, rigid, logical control and perforce relies upon the option of the student. The geographer is in fact continually exercising freedom of choice as to the materials he includes in his observations, but he is also continually drawing inferences as to their relation. His method, imperfect as it may be, is based on induction; he deals with sequences, though he may not regard these as a simple causal relation.

If we consider a given type of landscape, for example a North European heath, we may put down notes such as the following:

The sky is dull, ordinarily partly overcast, the horizon is indistinct and rarely more than a half-dozen miles distant, though seen from a height. The upland is gently and irregularly rolling and descends to broad, flat basins. There are no long slopes and no symmetrical patterns of surface form. Watercourses are short, with clear brownish water, and perennial. The brooks end in irregular swamps, with indistinct borders. Coarse grasses and rushes form marginal strips along the water bodies. The upland is covered with heather, furze, and bracken. Clumps of juniper abound, especially on the steeper, drier slopes. Cart traces lie along the longer ridges, exposing loose sand in the wheel tracks, and here and there a rusty, cemented base shows beneath the sand.

¹⁴ *Ibid.*, p. 39.

¹⁵ Benedetto Croce, *History, Its Theory and Practice* (New York, 1921), pp. 109-110. The statement applies to the history that has the goal simply of "making the past live again." There is, however, also a phenomenologic history, which may discover related forms and their expression.

Small flocks of sheep are scattered widely over the land. The almost complete absence of the works of man is notable. There are no fields or other enclosed tracts. The only buildings are sheep sheds, situated usually at a distance of several miles from one another, at convenient intersections of cart traces.

The account is not that of an individual scene, but a summation of general characteristics. References to other types of landscape are introduced by implication. Relations of form elements within the landscape are also noted. The items selected are based upon "knowledge of the actual situation," and there is an attempt at a synthesis of the form elements. Their significance is a matter of personal judgment. Objective standards may be substituted for them only in part, as by quantitative representation in the form of a map. Even thus the personal element is brought only under limited control, since it still operates in choosing the qualities to be represented. All that can be expected is the reduction of the personal element by agreement on a "predetermined mode of inquiry," which shall be logical.

Extensiveness of areal features.—The content of landscape is something less than the whole of its visible constituents. The identity of the landscape is determined first of all by conspicuousness of form, as implied in the following statement: "A correct representation of the surface form, of soil, and of superficially conspicuous masses of rock, of plant cover and water bodies, of the coasts and the sea, of areally conspicuous animal life and of the expression of human culture is the goal of geographic inquiry."¹⁶ The items specified are chosen because the experience of the author has shown their significance as to mass and relation. The chorologic position necessarily recognizes the importance of areal extensiveness of phenomena, this quality being inherent in the position. Herein lies an important contrast between geography and physiography. The character of the heath landscape described above is determined primarily by the dominance of sand, swamp, and heather. The most important geographic fact about Norway, aside from its location, probably is that four-fifths of its surface is barren highland, supporting neither forests nor flocks, a condition significant directly because of its extensiveness.

Habitat value as a basis for the determination of content.—Personal judgment of the content of landscape is determined further

¹⁶ Siegfried Passarge, *Die Grundlagen der Landschaftskunde*, Vol. 1 (Hamburg, 1919), p. 1.

by interest. Geography is distinctly anthropocentric, in the sense of value or use of the earth to man. We are interested in that part of the areal scene that concerns us as human beings because we are part of it, live with it, are limited by it, and modify it. Thus we select those qualities of landscape in particular that are or may be of use to us. We relinquish those features of area that may be significant to the geologist in earth history but are of no concern in the relation of man to his area. The physical qualities of landscape are those that have habitat value, present or potential.

The natural and the cultural landscape.—"Human geography does not oppose itself to a geography from which the human element is excluded; such a one has not existed except in the minds of a few exclusive specialists."¹⁷ It is a forcible abstraction, by every good geographic tradition a *tour de force*, to consider a landscape as though it were devoid of life. Because we are interested primarily in "cultures that grow with original vigor out of the lap of a maternal natural landscape, to which each is bound in the whole course of its existence,"¹⁸ geography is based on the reality of the union of physical and cultural elements of the landscape. The content of landscape is found therefore in the physical qualities of area that are significant to man and in the forms of his use of the area, in facts of physical background and facts of human culture. A valuable discussion of this principle is given by Krebs under the title "Natur- und Kulturlandschaft."¹⁹

For the first half of the content of landscape we may use the designation "site," which has become well established in plant ecology. A forest site is not simply the place where a forest stands; in its full connotation, the name is a qualitative expression of place in terms of forest growth, usually for the particular forest association that is in occupation of the site. In this sense the physical area

¹⁷ P. Vidal de la Blache, *op. cit.*, p. 3.

¹⁸ Oswald Spengler, *Der Untergang des Abendlandes; Umrisse einer Morphologie der Weltgeschichte*, Vol. 1 (München, 1920), p. 28: "Kulturen die mit urweltlicher Kraft aus dem Schosse einer mütterlichen Landschaft, an die jede von ihnen im ganzen Verlauf ihres Daseins streng gebunden ist, erblühen."

¹⁹ Norbert Krebs, *Natur- und Kulturlandschaft*, Ztsch. d. Gesellch. f. Erdk. zu Berlin, 1923, pp. 81-94. Reference to p. 83. He states the content of geography as being "in the area (*Raum*) itself with its surfaces, lines, and points, its form, circumference, and content. The relations to geometry, the pure areal science, become even more intimate when not only the area as such, but its position with references to other areas, is considered."

is the sum of all natural resources that man has at his disposal in the area. It is beyond his power to add to them; he may "develop" them, ignore them in part, or subtract from them by exploitation.

The second half of landscape viewed as a bilateral unit is its cultural expression. There is a strictly geographic way of thinking of culture; namely, as the impress of the works of man upon the area. We may think of people as associated within and with an area, as we may think of them as groups associated in descent or tradition. In the first case we are thinking of culture as a geographic expression, composed of forms which are a part of geographic phenomenology. In this view there is no place for a dualism of landscape.

THE APPLICATION OF THE MORPHOLOGIC METHOD

Form of induction.—The systematic organization of the content of landscape proceeds with the repression of a priori theories concerning it. The massing and ordering of phenomena as forms that are integrated into structures and the comparative study of the data as thus organized constitute the morphologic method of synthesis, a special empirical method. Morphology rests upon the following postulates: (1) that there is a unit of organic or quasi-organic quality; that is, a structure to which certain components are necessary, these component elements being called "forms" in this paper; (2) that similarity of form in different structures is recognized because of functional equivalence, the forms then being "homologous"; and (3) that the structural elements may be placed in series, especially into developmental sequence, ranging from incipient to final or completed stage. Morphologic study does not necessarily affirm an organism in the biologic sense, as, for example, in the sociology of Herbert Spencer, but only organized unit concepts that are related. Without being committed in any sense to a general biogenetic law, the organic analogy has proved most useful throughout the fields of social inquiry. It is a working device, the truth of which may perhaps be subject to question, but which leads nevertheless to increasingly valid conclusions.²⁰

The term "morphology" originated with Goethe, and expresses his contribution to modern science. It may be well to recall that he turned to biologic and geologic studies because he was interested in

²⁰ The assumption "as if," advanced by Hans Vaihinger in his *Die Philosophie des Als Ob*, 7th ed. (Leipzig, 1922), *passim*.

the nature and limits of cognition. Believing that there were things "accessible and inaccessible" to human knowledge, he concluded: "One need not seek for something beyond the phenomena; they themselves are the lore (*Lehre*)."²¹ Thus originated his form studies, and especially those of homology of form. His method of scientific inquiry rested on a definite philosophic position.

If therefore the morphologic method appears unpretentious to the student who is eager to come to large conclusions, it may be pointed out that it rests upon a deliberate restraint in the affirmation of knowledge. It is a purely evidential system, without prepossession regarding the meaning of its evidence, and presupposes a minimum of assumption; namely, only the reality of structural organization. Being objective and value-free, or nearly so, it is competent to arrive at increasingly significant results.

Application to social studies.—Morphologic method is not only the introduction to the biologic sciences, but it is steadily growing in importance in the social fields. In biology it is the study of organic forms and their structure, or the architecture of organisms. In the social field the continued synthesis of phenomena by morphologic method has been employed with greatest success perhaps in anthropology. This science can claim an honor roll of workers who have had the patience and skill to approach the study of social institutions phenomenologically, by the classification of forms, ranging from the concrete materials of clothing, housing, and tools to the language and customs of a group, thereby identifying step by step the complex structure of cultures. Spengler's brilliant and highly controversial thesis of history is far and away the most pretentious application of the method to the human field. Disregarding its elements of intuitionism, it is in effect comparative morphology as applied to history, the second volume bearing that title. He characterizes the forms that, to his mind, compose the great historic structures, subjects them to comparison for different periods as homologies, and traces developmental stages. By however much the author may have exceeded his and our knowledge in his daring synthesis, he has shown the possibilities of a morphology of history, or of the study of history on a scientific basis other than the causal formula of historical rationalism.²²

²¹ Goethes sämtliche Werke, Jubiläumsausgabe, Vol. 39 (Stuttgart & Berlin [1902]), p. 72.

²² Oswald Spengler, *op. cit.* The mathematico-philosophical thesis of the cultural cycle, the complete antithesis of Buckle, in particular is of such importance that it should be known to every geographer, whatever his position

The introduction of morphology into geography and the results.—Method and term were first formally introduced into geography by Carl Ritter, whose restoration of geography succeeded finally, not in the idealistic cosmology he had espoused, but because after all he laid the foundations for comparative regional study. Thereafter, perhaps because there was so much to do, the morphologic studies were rapidly narrowed so as to regard only the surficial form of the land. Grisebach's classic definition that "the morphologic system illuminates, by regarding the relationship of forms, the obscurity of their descent"²³ was applied with fateful results to the field of geography. The restriction of forms to relief, and interest in the origin of these forms, shortly established, under the leadership of Peschel, von Richthofen, and de la Noë, the genetic inquiry that was called geomorphology.²⁴ At first relying on the naïve descriptive classification of surface forms, as for example in Penck's *Morphologie der Erdoberfläche*, which is chorologic morphology, increasingly the trend was to classify on the basis of process, and to trace these forms back to more and more remote forms. The genetic historians of land form undertook increasingly the invasion of the field of geology. The final step was that some of these specialists lost sight almost completely of actual land forms and devoted themselves to the construction of theoretical forms deduced from individual physical processes. The defeat of geographic ends was therefore almost complete and such geomorphology became a separate branch of general earth science.

This autonomous genetic morphology inevitably led to an adverse reaction among the chorologically-minded geographers, not because the work was not carefully done, nor because it failed to develop a valuable field of knowledge, but because it became unrecognizable as geography.²⁵ Unfortunately a very general name was applied to a very specialized discipline. Under a misapprehension of the term, there has been a tendency to disregard in consequence the possibilities of the morphologic method. Vidal de la Blache perhaps earlier

may be with respect to Spengler's mysticism. There are at least three other similar views of the structure of history, apparently independently discovered: Flinders Petrie, *Revolutions of Civilization* (London and New York, 1911); Henry Adams, *The Rule of Phase in History*, in *The Degradation of the Democratic Dogma* (New York, 1919); and Leo Frobenius, *Paideuma: Umrisse einer Kultur- und Seelenlehre* (München, 1921).

²³ August Grisebach, *Die Vegetation der Erde nach ihrer klimatischen Anordnung*, Vol. I (Leipzig, 1884), p. 10.

²⁴ Albrecht Penck, *op. cit.*, pp. 5–6.

²⁵ Alfred Hettner, *op. cit.*, pp. 41–46.

than anyone else realized the situation and re-established morphology in its rightful position. The regional monographs that proceeded from his school expressed far more adequately than had been done before the full form content and structural relation of the landscape, finding in the cultural landscape the culminating expression of the organic area. In these studies, for example, the position of man and his works explicitly is that of the last and most important factor and forms in the landscape.

The perversion of geographic ends in the definition of morphology as the causal study of relief forms appears from the following considerations: (1) Relief is only one category of the physical landscape and ordinarily not the most important one; it almost never supplies the complete basis of a cultural form. (2) There is no necessary relation between the mode of origin of a relief form and its functional significance, the matter with which geography is most directly concerned. (3) An inevitable difficulty with a purely genetic morphology of relief forms is that most of the actual relief features of the earth are of very mixed origin. Behind the present forms lie processual associations, previous or ancestral forms, and almost inscrutable expressions of time. For the present at least, therefore, genetic morphology isolates those form elements that yield to causal analysis. In the selection of those relief facts that are legible as to genesis, it neglects some, even many, of the features of relief and abandons therefore the structural synthesis of even this segment of the landscape in so far as chorology is concerned.

In the late enthusiasm for studies of relief forms the climatologists were crowded into a relatively obscure position. Yet they, most largely, escaped the geographically sterile pursuit of the pure genetic method. Climatology has been phenomenologic rather than genetic. In spite of very scant knowledge of the origin of climatic conditions, the facts of climate have been summarized in terms of their geographic significance most admirably. In particular Köppen's series of trials at climatic synthesis, carefully developed as to biotically critical values, admirably restrained as to genetic explanation, are among the most important if not the most important contribution in this generation to geographic morphology. Yet such is the force of associations that few doubtless would name such climatic synthesis as a fundamental part of geographic morphology. It is more than a matter of mere nomenclature to object to the misapplication of the term morphology; it is a rut into which we have slipped and which has limited our range. Perhaps some of the cross-purposes in present-day geography may be traced to the failure to recognize

that all the facts of the subject are to be organized by a general system, through which alone their relation may be determined.

PREPARATORY SYSTEMATIC DESCRIPTION

The first step in morphologic study.—Historically "geography commenced by describing and registering; that is, as a systematic study. It proceeded thereupon to . . . genetic relation, morphology."²⁶ The geographic study is still thus begun. The description of observed facts is by some predetermined order that represents a preliminary grouping of the material. Such systematic description is for the purpose of morphologic relation and is really the beginning of morphologic synthesis. It is therefore distinguishable from morphology not at all in principle but in that it lies at a lower critical level. The relation is not dissimilar to that between taxonomy and biologic morphology.

Descriptive terminology.—The problem of geographic description differs from that of taxonomy principally in the availability of terms. The facts of area have been under popular observation to such an extent that a new terminology is for the most part not necessary. R. D. Salisbury held that the forms of landscape had generally received serviceable popular names and that codification might proceed from popular parlance without the coining of new terms. Proceeding largely in this manner, we are building up a list of form terms, that are being enriched from many areas and many languages. Very many more are still awaiting introduction into geographic literature. These terms apply as largely to soil, drainage, and climatic forms as they do to land surface. Also popular usage has named many vegetational associations and has prepared for us a still largely unprospected wealth of cultural form terms. Popular terminology is a fairly reliable warrant of the significance of the form, as implied in its adoption. Such names may apply to single form constituents, as glade, tarn, loess. Or they may be form associations of varying magnitude, as heath, steppe, piedmont. Or they may be proper names to designate unit landscapes, as, for example, the regional names that are in use for most parts of France. Such popular nomenclature is rich in genetic meaning, but with sure chorologic judgment it proceeds, not from cause, but from a generic summation; namely, from form similarities and contrasts.

If systematic description is a desideratum for geography, we are

²⁶ Norbert Krebs, *op. cit.*, p. 81.

still in great need of enlarging our descriptive vocabulary. The meagerness of our descriptive terms is surprising by comparison with other sciences. Contributing causes may be the idiographic tradition of unrelated description, and the past predilection for process studies which minimized the real multiplicity of forms.

The predetermined descriptive system.—The reduction of description to a system has been largely opposed by geographers and not entirely without cause. Once this happens the geographer is responsible within the limits of the system for any areal study he undertakes; otherwise he is free to roam, to choose, and to leave. We are not concerned here with geography as an art. As a science it must accept all feasible means for the regimentation of its data. However excellent the individualistic, impressionistic selection of phenomena may be, it is an artistic, not a scientific desideratum. The studies in geomorphology, in particular those of the school of Davis, represent perhaps the most determined attempt to oppose uncontrolled freedom of choice in observation by a strict limitation of observations and of method. Different observations may be compared as to their findings only if there is a reasonable agreement as to the classes of facts with which they deal. The attempt at a broad synthesis of regional studies by employing our existing literature immediately runs into difficulties, because the materials do not fit together. Findings on the most important theme of human destructiveness of natural landscape are very difficult to make because there are no adequate points of reference. Some observers note soil erosion systematically, others casually, and still others may pay no attention to it. If geography is to be systematic and not idiosyncratic, there must be increasing agreement as to items of observation. In particular this should mean a general descriptive scheme to be followed in the collection of field notes.²⁷

A general descriptive scheme, intended to catalogue areal facts broadly, without proceeding at this stage from hypothetical origins and connections, has been recently proposed by Passarge under the name *Beschreibende Landschaftskunde*.²⁸ It is the first comprehensive treatment of this subject since von Richthofen's *Führer für Forschungsreisende*, written just before the most flourishing period of geomorphology.²⁹ The work of Passarge is somewhat rough-

²⁷ Carl O. Sauer, The Survey Method in Geography and Its Objectives, *Annals Assoc. Amer. Geographers*, Vol. 14, 1924, pp. 17-33.

²⁸ Siegfried Passarge, *op. cit.*; Volume I has this expression as a subtitle.

²⁹ Ferdinand von Richthofen, *Führer für Forschungsreisende* (Berlin, 1886).

hewn and it is perhaps excessively schematic, yet it is the most adequate consideration by far that the whole matter of geographic description has had. Its express purpose is "first of all to determine the facts and to attempt a correct presentation of the significant, visible facts of area without any attempt at explanation and speculation."³⁰ The plan provides

for the systematic observation of the phenomena that compose the landscape. The method resembles most closely the chrie, a device for the collection of material in theme writing. It helps to see as much as possible and to miss as little as possible and has the further advantage that all observations are ordered. If earlier geographers had been familiar with a method of systematic observation of landscape, it would have been impossible for the characteristic red color of tropical residual soils to have escaped attention until von Richthofen discovered that fact.³¹

Passarge proceeds with an elaborate schedule of notes covering all form categories of the landscape, beginning with atmospheric effects and ending with forms of habitation. From these he proceeds to a descriptive classification of form associations into larger areal terms. For the further elaboration of the plan the reader is referred to the volume in question, as worthy of careful consideration.

The author has applied his system elsewhere to the "pure" as against the "explanatory" description of areas, as for example in his characterization of the valley of the Okavango, in the northern salt steppe of the Kalahari.³² That he succeeds in giving the reader an adequate picture of the composition of area will probably be admitted.

One may note that Passarge's supposedly purely descriptive procedure is actually based on large experience in areal studies, through which a judgment as to the significant constituents of landscape has been formed. These are really determined through morphologic knowledge, though the classification is not genetic, but properly based on the naïvely generic forms. The capacious dragnet which Passarge has fashioned, though disclaiming all attempt at explanation, is in reality a device fashioned by experienced hands for catching all that may be wanted in an areal morphology and for deferring explanation until the whole material is sorted.

³⁰ Siegfried Passarge, *op. cit.*, p. vi.

³¹ *Ibid.*, p. 5.

³² *Idem*, Die Steppen-Flusstalung des Okawango im Trockenwald-Sandfeld der Nordkalahari, *Mitt. d. Geogr. Gesellsch. Hamburg*, Vol. 32, 1919, pp. 1-40.

FORMS OF LANDSCAPE AND THEIR STRUCTURE

The division between natural and cultural landscapes.—We cannot form an idea of landscape except in terms of its time relations as well as of its space relations. It is in continuous process of development or of dissolution and replacement. It is in this sense a true appreciation of historical values that has caused the geomorphologists to tie the present physical landscape back into its geologic origins, and to derive it therefrom step by step. In the chorologic sense, however, the modification of the area by man and its appropriation to his uses are of dominant importance. The area before the introduction of man's activity is represented by one body of morphologic facts. The forms that man has introduced are another set. We may call the former, with reference to man, the original, natural landscape. In its entirety it no longer exists in many parts of the world, but its reconstruction and understanding are the first part of formal morphology. Is it perhaps too broad a generalization to say that geography dissociates itself from geology at the point of the introduction of man into the areal scene? Under this view the prior events belong strictly in the field of geology and their historical treatment in geography is only a descriptive device employed where necessary to make clear the relationship of physical forms that are significant in the habitat.

The works of man express themselves in the cultural landscape. There may be a succession of these landscapes with a succession of cultures. They are derived in each case from the natural landscape, man expressing his place in nature as a distinct agent of modification. Of especial significance is that climax of culture which we call civilization. The cultural landscape then is subject to change either by the development of a culture or by a replacement of cultures. The datum line from which change is measured is the natural condition of the landscape. The division of forms into natural and cultural is the necessary basis for determining the areal importance and character of man's activity. In the universal, but not necessarily cosmologic sense, geography then becomes that part of the latest or human chapter in earth history which is concerned with the differentiation of the areal scene by man.

The natural landscape: geognostic basis.—In the subsequent sections on the natural landscape a distinction is implied between the historical inquiry into origin of features and their strictly morphologic organization into a group of forms, fundamental to the cul-

tural expression of the area. We are concerned alone with the latter in principle, with the former only as descriptive convenience.

The forms of the natural landscape involve first of all the materials of the earth's crust which have in some important measure determined the surface forms. The geographer borrows from the geologist knowledge of the substantial differences of the outer lithosphere as to composition, structure, and mass. Geology, being the study of the history of these materials, has devised its classification on the basis of succession of formations, grouped as to period. In formations per se the geographer has no interest. He is concerned, however, with that more primitive phase of geology, called geognosy, which regards kind and position of material but not historical succession. The name of a geologic formation may be meaningless geographically, if it lumps lithologic differences, structural differences, and differences in mass under one term. Geognostic condition provides a basis of conversion of geologic data into geographic values. The geographer is interested in knowing whether the base of a landscape is limestone or sandstone, whether the rocks are massive or intercalated, whether they are broken by joints or are affected by other structural conditions expressed in the surface. These matters may be significant to the understanding of topography, soil, drainage, and mineral distribution.

The application of geognostic data in geographic studies is usual in a sense, areal studies being hardly feasible without some regard for the underlying materials. Yet to find the most adequate analysis of the expression of the underlying materials in the surface it is probably necessary to go back to the work of the older American and British geologists, such as Powell, Dutton, Gilbert, Shaler, and Archibald Geikie. In the aggregate, of course, the geologic literature that touches upon such matters is enormous, but it is made up of rather incidental and informal items, because landscape is not in the central field of interest of the geologist. The formal analysis of critical geognostic qualities and their synthesis into areal generalizations has not had a great deal of attention. Adequately comparable data are still insufficient from the viewpoint of geography. In briefest form Sapper has lately attempted a general consideration of the relation of geologic forms to the landscapes of varying climates, thereby illuminating the entire subject of regional geography.⁸⁸

Rigorous methodologist that he is, Passarge has not failed to

⁸⁸ Karl Sapper, *Geologischer Bau und Landschaftsbild* (Braunschweig, 1917).

scrutinize the geographic bearing of rock character and condition, and has applied in intensive areal study the following observations (somewhat adapted):⁸⁴

Physical resistance

Soft, easily eroded formations

Rocks of intermediate resistance

much broken (*zerklüftet*)

moderately broken

little broken

Rocks of high resistance

as above

Chemical resistance and solubility

Easily soluble

highly permeable

moderately permeable

relatively impermeable

Moderately subject to solution and chemical alteration

as above

Resistant

In a later study he added provision for rocks notably subject to creep (*fluktionsfähig*).⁸⁵ An interpretation of geologic conditions in terms of equivalence of resistance has never been undertaken for this country. It is probably possible only within the limits of a generally similar climatic condition. We have numerous classifications of so-called physiographic regions, poorly defined as to their criteria, but no truly geognostic classification of area, which, together with relief representation, and climatic areas, is alone competent to provide the base map of all geographic morphology.

The natural landscape: climatic basis.—The second and greater link that connects the forms of the natural landscape into a system is climate. We may say confidently that the resemblance or contrast between natural landscapes in the large is primarily a matter of climate. We may go further and assert that under a given climate a distinctive landscape will develop in time, the climate ultimately cancelling the geognostic factor in many cases.

Physiography, especially in texts, has, largely, either ignored this fact or has subordinated it to such an extent that it is to be read only between the lines. The failure to regard the climatic sum of

⁸⁴ Siegfried Passarge, *Physiologische Morphologie*, Mitt. d. Geogr. Gesellsch. Hamburg, Vol. 26, 1912, pp. 133-337.

⁸⁵ *Idem*, *Morphologie des Messtischblattes Stadtremsa*, *ibid.*, Vol. 28, 1914, pp. 1-221.

physiographic processes as differing greatly from region to region may be due to insufficient experience in different climatic areas and to a predilection for deductive approach. Most physiographic studies have been made in intermediate latitudes of abundant precipitation, and there has been a tendency to think of the agencies in terms of a standardized climatic milieu. The appreciation even of one set of phenomena, as for example drainage forms, is likely to be too much conventionalized by applying the schematism of standardized physiographic process and its results to New England and the Gulf states, to the Atlantic and the Pacific coasts, not to mention the deserts, the tropics, and the polar margins.

But, if we start from the areal diversity of climates, we consider at once differences in penetration of heat and cold diurnally and seasonally, the varying areal expression of precipitation as to amount, form, intensity, and seasonal distribution, the wind as a factor varying with area, and above all the numerous possibilities of combination of temperature, precipitation, dry weather, and wind. In short, we place major emphasis on the totality of weather conditions in the molding of soil, drainage, and surface features. It is geographically much more important to establish the synthesis of natural landscape forms in terms of the individual climatic area than to follow through the mechanics of a single process, rarely expressing itself individually in a land form of any great extent.

The harmony of climate and landscape, insufficiently developed by the schools of physiography, has become the keystone of geographic morphology in the physical sense. In this country the emergence of this concept is to be sought largely in the studies in the arid and semi-arid West, though they did not result at once in the realization of the implied existence of a distinct set of land forms for every climate. In the morphologic form category of soils, the climatic factor was fully discovered first at the hand of Russian students, and was used by them as the primary basis of soil classification³⁶ in a more thoroughgoing manner than that which had been applied to topographic forms.³⁷ Under the direction of Marbut the climatic system has become basal to the work of the United States Bureau of Soils. Thus the ground was prepared for the general synthesis of physical landscape in terms of climatic regions.³⁸ Most

³⁶ K. Glinka, *Die Typen der Bodenbildung, ihre Klassifikation und geographische Verbreitung* (Berlin, 1914); revised and extended by E. Ramann, *Bodenbildung und Bodeneinteilung (System der Böden)* (Berlin, 1918).

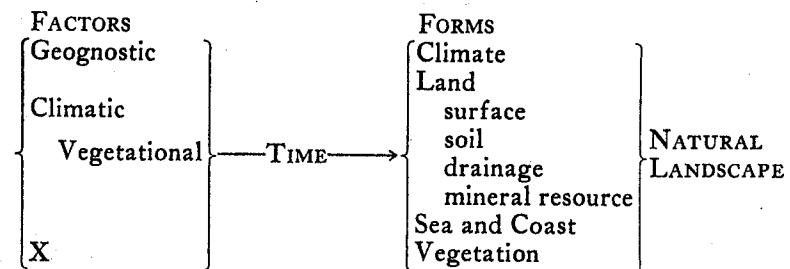
³⁷ For desert forms there was in existence the synthesis of Johannes Walther, *Das Gesetz der Wüstenbildung in Gegenwart und Vorzeit* (Berlin, 1900).

³⁸ Excellently done by Sapper, *op. cit.*; but also strongly emphasized by

recently, Passarge, using Köppen's climatic classification, has undertaken a comprehensive methodology on this basis.³⁹

The relation of climate to landscape is expressed in part through vegetation, which arrests or transforms the climatic forces. We therefore need to recognize not only the presence or absence of a cover of vegetation, but also the type of cover that is interposed between the exogenous forces of climate and the materials of the earth and that acts on the materials beneath.

Diagrammatic representation of the morphology of the natural landscape.—We may now attempt a diagram of the nature of physical morphology to express the relation of landscape, constituent forms, time, and connecting causal factors:



The thing to be known is the natural landscape. It becomes known through the totality of its forms. These forms are thought of not for and by themselves, as a soil specialist would regard soils, for example, but in their relation to one another and in their place in the landscape, each landscape being a definite combination of form values. Behind the forms lie time and cause. The primary genetic bonds are climatic and geognostic, the former being in general dominant, and operating directly as well as through vegetation. The "X" factor is the pragmatic "and," the always unequated remnant. These factors are justified as a device for the connection of the forms, not as the end of inquiry. They lead toward the concept of the natural landscape which in turn leads to the cultural landscape. The character of the landscape is determined also by its position on the time line. Whether this line is of determinate or infinite length does not concern us as geographers. In some measure, certainly, the idea of a climax landscape is useful, a landscape that,

W. M. Davis and G. Braun, *Grundzüge der Physiogeographie*, 2nd ed., Vol. 2, *Morphologie* (Leipzig u. Berlin, 1915), especially in the final chapters.

³⁹ Siegfried Passarge, *Grundlagen der Landschaftskunde*, Vols. 2, 3 (Berlin, 1921, 1922).

given a constancy of impinging factors, has exhausted the possibilities of autogenous development. Through the medium of time the application of factor to form as cause-and-effect relation is limited; time itself is a great factor. We are interested in function, not in a determination of cosmic unity. For all chorologic purposes the emphasis in the diagram lies at its right hand; time and factor have only an explanatory descriptive role.

This position with reference to the natural landscape involves a reaffirmation of the place of physical geography, certainly not as physiography nor geomorphology as ordinarily defined, but as physical morphology, which draws freely from geology and physiography certain results to be built into a view of physical landscape as a habitat complex. This physical geography is the proper introduction to the full chorologic inquiry that is our goal.

Forms of the natural landscape: climate.—In the physical structure of landscape, climate is first in importance. In the diagram it appears at the head of the list of forms and also as the major factor behind the whole category of forms. As a form, climate is an areal expression, the sum of the atmospheric features of the area. This is the sense in which it is treated in climatology. In American literature climates were first introduced prominently as areal forms, fundamental to geography in general, through Tower's chapters on climate in *Salisbury, Barrows, and Tower's Elements of Geography*.⁴⁰ The value of this view has been demonstrated by the steadily increasing role which climatology has played in the fundamental courses of instruction. In no respect are we as near to general agreement as in this.

Climatology is areal reality; meteorology is general process. The contrast is that between physical geography and physiography.

Land forms in the natural landscape.—The land includes four edaphic elements or properties analogous to the climatic elements; namely, surface or land form in the narrow sense, soil, drainage, and mineral forms. In the case of surface forms we are dealing with a body of fact that is of interest to geomorphology, to physiography, and to geographic morphology. The first is concerned with history, the second with process, the third with description and relation to other forms. For our purposes surface forms are to be regarded as climates are in climatology. Strictly we are concerned with the character of relief only; that is, with expressions of slope and exposure in relation to the other constituent forms of the landscape.

⁴⁰ Rollin D. Salisbury, Harlan H. Barrows, and Walter S. Tower, *The Elements of Geography* (New York, 1912), chapters 9-11, pp. 154-225.

The topographic map, interpreted in terms of use significance of different slopes, is in principle the complete chorologic representation of surface form. The relation of surface form to climate is so close that the grouping of surfaces by climates is warranted generally. Geognostic relation of surface also lends itself well to the areal grouping of land forms. The further penetration into genesis of forms leads increasingly away from geographic ends. Restraint in this respect is necessary and is attained through a proper realization of the goal of areal reality.

The areal differentiation of soils fundamentally is based on differences of productivity, or their habitat significance. Soils as areal form constituents are primarily grouped by climates; the secondary classification is geognostic and therefore also chorologically satisfactory. The placing of soils into the structure of landscape therefore presents little difficulty, the soil survey being in fact a highly specialized form of physical geography. Unlike some physiographers and geomorphologists, the field student of soils is not pursuing a nongeographic end, but is limiting himself to a small part of the geographic field.

Drainage forms are of course direct expressions of climate, and the most feasible classification of streams, swamps, and bodies of standing water is in climatic terms. For instance, moors are a type of high-latitude swamp, permanent features under conditions of low evaporation. Their growth is especially favored by the presence of certain plants, such as sphagnum moss. Their position is not restricted to lowlands, but they extend over fairly irregular surfaces by the expansion of a marginal zone of spongy vegetation. These swamps illustrate the interrelation of physical areal forms. Under them a distinctive soil is developed and even the subsoil is altered. This swampy covering also protects the land surface it has occupied from the attacks of running water and wind and molds it into broadly rounded forms. Where climatic conditions are not favorable to the development of such swamps, both in still higher and in lower latitudes, the forms of drainage, soil, and surface change markedly.

Mineral resources belong among the physical forms under the view of the physical landscape as a human habitat. Here the geognostic factor dominates genetically. The diagrammatic relation still holds in a measure, because of the concentration of minerals due to underground waters both at and beneath the surface. It would be pedantic to urge this point strongly, nor are we desirous to urge genetic relation as a necessary principle.

Forms of the sea in the natural landscape.—The relation of sea to land is organizable on the same basis of climate and geognosy. The seacoasts are in the main an expression of tectonic history and of climatic setting. Areally, climates afford the broader basis of classification, because elevation and subsidence of coasts have varied and are changing, as to direction and amount, so greatly, over short distances as to make a tectonic classification of seashores chorologically unsatisfactory. The seas themselves are obviously as intimately related to climate as is the land. Their currents, surface conditions, density, and temperatures are as certainly to be classified in climatic terms as land forms.

Vegetation forms in the natural landscape.—A. von Humboldt was the first to recognize, through systematic observations, the importance of vegetation in the character of the landscape. "However much the character of the different parts of the world depends on the totality of external appearances; though outline of mountains, physiognomy of plants and animals, cloud forms and transparency of the atmosphere compose the general impression; yet it is not to be denied that the most important element in this impression is the cover of vegetation."⁴¹ The bonds between climate and vegetation are so direct and strong that a large measure of climatic grouping of vegetation forms is possible. Some plant geographers have found the classification of vegetational associations most desirable in terms of thermal or moisture belts.

Summary of the form relations in the natural landscape.—The large emphasis on climate in the previous statements does not mean that geography is to be transformed into climatology. The physical area is fundamental to any geographic study because it furnishes the materials out of which man builds his culture. The identity of the physical area rests fundamentally on a distinctive association of physical forms. In the physical world, generic character of area and its genesis are coupled so closely that the one becomes an aid to the recognition of the other. In particular, climate, itself an areal form, largely obscure as to origin, so largely controls the expression of the other physical forms that in many areas it may be considered the determinant of form association. An express disclaimer may be entered, however, against the notion of the necessity of a genetic bond in order to organize the phenomenology of the natural landscape. The existence of such bonds has been determined empiri-

⁴¹ Alexander von Humboldt, *Ansichten der Natur*, Vol. 2 (Stuttgart & Tübingen, 1849), p. 20.

cally. By regarding the relationship of forms we have discovered an important light on "the obscurity of their descent," but as geographers we are not enjoined to trace out the nature of this descent. This remains the problem of geomorphology, which indeed now appears more complicated than ever, the validity of climatic control and of great secular changes of climate being accepted.

Thus far the way is pretty well marked. We know the "inorganic" composition of landscape fairly well, and, except for a somewhat excessive aloofness existing between plant and general geography, the place of vegetation in the landscape is properly cared for.⁴²

The extension of morphology to the cultural landscape.—The natural landscape is being subjected to transformation at the hands of man, the last and for us the most important morphologic factor. By his cultures he makes use of the natural forms, in many cases alters them, in some destroys them.

⁴² Alfred Hettner, *op. cit.*, p. 39, comments as follows on biogeography: "The great majority of studies in plant and animal geography have been made by botanists and zoologists, even though these works do not always completely satisfy our geographic needs. The botanist and zoologist are concerned with plants and animals, we with lands. . . . When they carry on plant and animal geography in this narrower sense, as, for example, Grisebach in his brilliant volume on the vegetation of the earth, they are doing geographic work, in the same manner as meteorologists who concern themselves with climatology; for the purpose is geographic, the results fit more closely into the structure of geographic instruction than into that of botany or zoology, and the whole process of thought and inquiry, oriented as it is about climate and soil, is geographic. We geographers are far from being jealous on that account; on the contrary, we acknowledge such aid gratefully; but rightly we have commenced also to do plant and animal geography, because certain problems concern us more than they do those who are not geographers and because we possess certain valuable preparations for such studies." The work of plant and animal geographers illustrates the partial artificiality of academic compartments. They require so specialized a training that ordinarily they are professionally classed as botanists and zoologists. Their method, however, is geographic to such an extent and their findings are so significant to geography that their work is more appreciated and perhaps even better evaluated by geographers than by biologists generally. Occasional field biologists, such as Bates, Hudson, and Beebe, have done work that encompasses so large a part of the landscape that they are really geographers of the highest accomplishment. It is, however, true that vegetation or fauna may be regarded somewhat differently as a part of the human habitat (economic plant and animal geography?) from the view of them as a part of botany or zoology. In this difference lies the justification of Hettner's recommendation of participation by the geographer in plant and animal studies. Now and then a geographer, as for instance Gradmann and Waibel, has mastered the field of biogeography to the enrichment of his whole position.

The study of the cultural landscape is, as yet, largely an untilled field. Recent results in the field of plant ecology will probably supply many useful leads for the human geographer, for cultural morphology might be called human ecology. In contrast to the position of Barrows in this matter, the present thesis would eliminate physiologic ecology or autecology and seek for parallels in synecology. It is better not to force into geography too much biological nomenclature. The name ecology is not needed: it is both morphology and physiology of the biotic association. Since we waive the claim for the measurement of environmental influences, we may use, in preference to ecology, the term morphology to apply to cultural study, since it describes perfectly the method.

Among geographers in America who have concerned themselves with systematic inquiry into cultural forms, Mark Jefferson, O. E. Baker, and M. Rousseau have done outstanding pioneering. Brunhes' "essential facts of geography" represent perhaps the most widely appreciated classification of cultural forms.⁴³ Sten De Geer's population atlas of Sweden⁴⁴ was the first major contribution of a student who has concentrated his attention strictly on cultural morphology. Vaughan Cornish introduced the concepts of "march," "storehouse," and "crossroads" in a most valuable contribution to urban problems.⁴⁵ Most recently, Walter Geisler has undertaken a synthesis of the urban forms of Germany, with the deserved subtitle, "A contribution to the morphology of the cultural landscape."⁴⁶ These pioneers have found productive ground; our periodical literature suggests that a rush of homesteaders may soon be under way.

Diagrammatic representation of the morphology of the cultural landscape.—The cultural landscape is the geographic area in the final meaning (*Chore*). Its forms are all the works of man that characterize the landscape. Under this definition we are not concerned in geography with the energy, customs, or beliefs of man but with man's record upon the landscape. Forms of population are the phenomena of mass or density in general and of recurrent displacement, as seasonal migration. Housing includes the types of structures

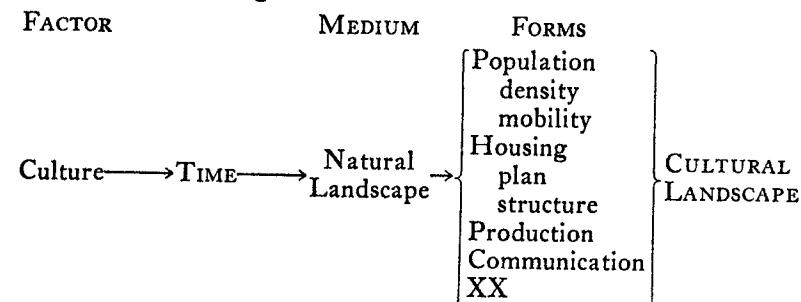
⁴³ Jean Brunhes, *La Géographie humaine*, ed. 2 (Paris, 1912), pp. 62-66, 89-455; Amer. transl., *Human Geography* (Chicago and New York, 1920), pp. 48-52, 74-414.

⁴⁴ Sten De Geer, *Karta över befolkningens fördelning i Sverige den 1 januar 1917* (Stockholm, 1919).

⁴⁵ Vaughan Cornish, *The Great Capitals* (London, 1923).

⁴⁶ Walter Geisler, *Die deutsche Stadt: ein Beitrag zur Morphologie der Kulturlandschaft* (Stuttgart, 1924).

man builds and their grouping, either dispersed as in many rural districts, or agglomerated into villages or cities in varying plans (*Städtebild*). Forms of production are the types of land utilization for primary products, farms, forests, mines, and those negative areas which he has ignored.



The cultural landscape is fashioned from a natural landscape by a culture group. Culture is the agent, the natural area is the medium, the cultural landscape the result. Under the influence of a given culture, itself changing through time, the landscape undergoes development, passing through phases, and probably reaching ultimately the end of its cycle of development. With the introduction of a different—that is, an alien—culture, a rejuvenation of the cultural landscape sets in, or a new landscape is superimposed on remnants of an older one. The natural landscape is of course of fundamental importance, for it supplies the materials out of which the cultural landscape is formed. The shaping force, however, lies in the culture itself. Within the wide limits of the physical equipment of area lie many possible choices for man, as Vidal never grew weary of pointing out. This is the meaning of adaptation, through which, aided by those suggestions which man has derived from nature, perhaps by an imitative process, largely subconscious, we get the feeling of harmony between the human habitation and the landscape into which it so fittingly blends. But these, too, are derived from the mind of man, not imposed by nature, and hence are cultural expressions.

MORPHOLOGY AS APPLIED TO THE BRANCHES OF GEOGRAPHY

The consolidation of the two diagrams gives an approximation of the total scientific content of geography on the phenomenologic

basis by which we have proceeded.⁴⁷ They may readily be expressed so as to define the branches of geography. (1) The study of the form categories per se in their general relation, the system of the forms of landscape, is morphology in the purely methodologic sense, and is the equivalent of what is called, especially in France and Germany, general geography, the propaedeutic through which the student learns to work with his materials. (2) Regional geography is comparative morphology, the process of placing individual landscapes into relation to other landscapes. In the full chorologic sense, this is the ordering of cultural, not of natural landscapes. Such a critical synthesis of regions for the entire world is the latest contribution by Passarge, who has thereby nearly rounded out a critique of the entire field of geography.⁴⁸ (3) Historical geography may be considered as the series of changes which the cultural landscapes have undergone and therefore involves the reconstruction of past cultural landscapes. Of special concern is the catalytic relation of civilized man to area and the effects of the replacement of cultures. From this difficult and little-touched field alone may be gained a full realization of the development of the present cultural landscape out of earlier cultures and the natural landscape. (4) Commercial geography deals with the forms of production and the facilities for distribution of the products of areas.

BEYOND SCIENCE

The morphologic discipline enables the organization of the fields of geography as positive science. A good deal of the meaning of area lies beyond scientific regimentation. The best geography has never disregarded the esthetic qualities of landscape, to which we know no approach other than the subjective. Humboldt's "physiognomy," Banse's "soul," Volz's "rhythm," Gradmann's "harmony" of landscape, all lie beyond science. These writers seem to have discovered a symphonic quality in the contemplation of the areal scene, proceeding from a full novitiate in scientific studies and yet apart therefrom. To some, whatever is mystical is an abomination. Yet

⁴⁷ The conclusions presented in this paper are substantially in agreement with Sten De Geer's article On the Definition, Method, and Classification of Geography, *Geogr. Annaler*, Vol. 5, 1923, pp. 1-37, with the contrast that a "concrete" *landscape* takes the place of De Geer's "abstract" *areal relation*.

⁴⁸ Siegfried Passarge, *Vergleichende Landschaftskunde* (Berlin, 1923); *Die Landschaftsgürtel der Erde* (Breslau, 1923).

it is significant that there are others, and among them some of the best, who believe, that having observed widely and charted diligently, there yet remains a quality of understanding at a higher plane that may not be reduced to formal process.⁴⁹

DIVERGENT VIEWS OF GEOGRAPHY

The geographic thesis of this essay is so largely at variance with certain other views of the subject that it may be desirable to set forth in summary form what has been expressed and implied as to contrast in the several positions.

Geomorphology as a branch of geography.—German geographers in particular tend to regard geomorphology as an essential division of geography, and use largely the term *Oberflächengestaltung*, or the record of development of surficial form. The forms considered are ordinarily topographic only. The content of geomorphology has been most broadly defined by Penck,⁵⁰ who includes the following forms: plains, hill surfaces, valleys, basins, mountains, cavernous forms, seacoasts, seafloors, islands. These descriptive topographic terms are studied by geomorphology as to their derivation, not as to use significance.

Geomorphology being the history of topography, it derives present surfaces from previous forms and records the processes involved. A study of the geomorphology of the Sierra Nevada is a history of the sculpturing of the mountain massif, concerned with the uplift of the earth block and the stages of modification in which erosional processes, secondary deformations, and structural conditions are in complex relations. Relief features in this sense are the result of the opposition of orogenic and degradational processes through geologic periods of time. Certain features, such as peneplains and terrace remnants, thus have high diagnostic value in reading the record of modification of surface. These elements of the landscape, however, may be of little or no significance in the chorologic sense. To geomorphology the peneplain has been ex-

⁴⁹ A good statement of current searchings in this field is by Robert Gradmann, *Das harmonische Landschaftsbild*, *Ztschr. d. Gesellsch. f. Erdk. z. Berlin*, 1924, pp. 129-147. Ewald Banse has been publishing since 1922 a non- or anti-scientific journal, *Die neue Geographie*, in which numerous good items are enclosed in a repellently polemic shell.

⁵⁰ Albrecht Penck, *Morphologie der Erdoberfläche*, Vol. 2 (Stuttgart, 1894), pp. 1-2.

tremely important; the trend of geography has not been notably affected by its discovery. Out of the topographic complex the geomorphologist may select one body of facts illustrative of earth history, the geographer will use a largely different set of facts that have habitat significance.

The geomorphologist, therefore, is likely to be a specialized historical geologist, working on certain, usually late, chapters of earth history. Conventional historical geology is mostly concerned with the making of rock formations. The geomorphologist directs attention to erosional and deformational surfaces in the record of the rocks. To such an extent has this been the American orientation that we have in our country little geomorphologic work of recent date that is consciously geographic in purpose; that is, descriptive of actual land surfaces.

The geomorphologist can and does establish a connection between the fields of geography and geology and his labors further our own work. He advances our studies of landscape materially where he has preceded the geographer, and we properly regard him potentially as much a collaborator in geography as in geology. One of the present needs in American geography is a greater familiarity with and application of geomorphologic studies.

Physiography and physical geography.—When T. H. Huxley reapplied the term physiography he disclaimed expressly the desire to reform physical geography. He was not lecturing, he said, "on any particular branch of natural knowledge, but on natural phenomena in general."⁵¹ The subtitle of his treatise reads "An Introduction to the Study of Nature." He chose the basin of the Thames as the area for his demonstration, not through chorologic interest, but in order to show that any area contained abundant material for the demonstration of the general laws of physical science. Huxley said:

I endeavoured to show that the application of the plainest and simplest processes of reasoning to any of these phenomena suffices to show, lying behind it, a cause, which will again suggest another; until, step, by step, the conviction dawns upon the learner that, to attain even an elementary conception of what goes on in his parish he must know something about the universe; that the pebble he kicks aside would not be what it is and where it is unless a particular chapter of the earth's history, finished untold ages ago, had been exactly what it was.⁵²

⁵¹ T. H. Huxley, *Physiography: an Introduction to the Study of Nature*, 2nd ed. (New York, 1878), p. vi.

⁵² *Ibid.*, pp. vii–viii.

The two central ideas in his mind were the unity of physical law as shown by the features of the earth and the evolutionary march of the geologic record. It was the bright hour of dawn in scientific monism, with Huxley officiating at the observation of the lands. Physiography served in such a canonical role in elementary scientific education until a later age of machinery sent it into the discard in favor of "general science."

Physiography is still the general science of the earth, and concerns itself with the physical processes that operate at the surface of the earth and in the earth's crust. We still find the captions that Huxley introduced into his text: the work of rain and rivers, ice and its work, the sea and its work, earthquakes and volcanoes. These things have chorologic expression, but they are studied as general processes. As an investigator the physiographer must be above all things a physicist, and increasing demands are made on his physical and mathematical knowledge. The way of the development of physiography as research is through geophysical institutes. Academically it fits in best as a part of dynamic geology. The geographer probably needs to know little more of it than he should know of historical geology.

One may question, therefore, the propriety of such terms as regional physiography and physiographic regions. They contradict the essential meaning of the subject and ordinarily mean rather a loose form of geomorphology, which of necessity has areal expression. Physiography was conceived as a purely dynamic relation and is categorically incapable of consistent areal expression unless it becomes also a name applied to physical geography or to geomorphology.

Geographic morphology vs. "geographic influences."—The study of the physical environment was subjected to trenchant criticism by L. Febvre, with an equally incisive foreword by Henri Berr.⁵³ Both thoroughly relish the chance to riddle this geographic ambition. Geography as they see it is "to give an example of the true task of synthesis. . . . The effort of synthesis is a directed activity; it is not a premature realization."⁵⁴ Questions of environment "may have for the geographer their interest; but they are not his end. He must guard well against acclaiming as 'scientific' verities theories of adaptation 'simpliste' in character that more competent people are in process of completing or correcting."⁵⁵ "What is, then, the

⁵³ Lucien Febvre, *La Terre et l'Évolution humaine* (Paris, 1922).

⁵⁴ *Ibid.*, p. ix.

⁵⁵ *Ibid.*, p. ii.

commendable attitude in human geography? It can consist only in searching for the relations that exist between earth and life, the rapport which exists between the external milieu and the activity of the occupants."⁵⁶ Vidal de la Blache's thesis that in the relation of man to the earth there exists less of necessary adaptation than of "possibilisme" is worked out with skill and conviction. Excepting for their spirited devotion to the master of French geography, these authors are not really familiar with geographic thought. They do not fairly represent the tenets of geography, because they know chiefly the publicists of environmentalism, against whom they consider Vidal as the outstanding bulwark. Vidal will have an honored place in the history of geography, but we are no longer much impressed by his concern to establish decently good relations with rationalistic thought. Rationalism has seen better days than these; we no longer need to come to terms with it by diplomatic compromise. In spite of the deficient orientation in geographic thought, Febyre's volume directs a quality of dialectic at one geographic school which entitles it to high rank in geographic criticism.

In this country the theme that geography is the study of natural environment has been dominant in the present generation. It has come to be advertised abroad that such is the American definition of geography.⁵⁷ The earliest term was "environmental control." This was succeeded by "response," "influence," "adjustment," or some other word that does not change the meaning, but substitutes a more cautious term for the ringing declaration of control. All these positions are mechanistic. In some way they hope to measure the force that physical environment exerts over man. The landscape as such has no interest for them, but only those cultural features for which a causal connection with the physical environment can be established. The aim, therefore, is to make of geography a part of biophysics, concerned with human tropisms.

Geographic morphology does not deny determinism, nor does it require adhesion to that particular faith in order to qualify in the profession. Geography under the banner of environmentalism represents a dogma, the assertion of a faith that brings rest to a spirit vexed by the riddle of the universe. It was a new evangel for the age of reason, which set up its particular form of adequate order and

⁵⁶ *Ibid.*, p. 12.

⁵⁷ S. Van Valkenburg, *Doel en richting der geografie*, *Tijdschr. v. d. K. Nederl. Aardrijksk. Genootschap*, ser. 2, Vol. 41, 1924, pp. 138-140.

even of ultimate purpose. The exposition of the faith could proceed only by finding testimonials to its efficacy. To the true believer there were visible evidences of what he thought should be, which were not to be seen by those who were weak in the faith. Unless one has the proper temperament, his continued elaboration of this single thesis with the weak instruments at his hand becomes dreadfully monotonous. In such a study one knows beforehand that one will encounter only variants of the one theme of "influence."

The narrowly rationalistic thesis conceives of environment as process, and of some of the qualities and activities of man as products. The agency is physical nature; man responds or adapts himself. Simple as the thesis sounds, it incurs continually grave difficulties in the matching of specific response to specific stimulus or inhibition. The direct influence of environmental stimuli is purely somatic. What happens to man through the influence of his physical surroundings is beyond the competence of the geographer; at most he may keep informed as to physiologic research in that field. What man does in an area because of tabu or totemism or because of his own will involves use of environment rather than the active agency of the environment. It would, therefore, appear that environmentalism has been shooting neither at cause nor at effect, but rather that it is bagging its own decoys.⁵⁸

CONCLUSION

In the colorful reality of life there is a continuous resistance of fact to confinement within any "simpliste" theory. We are concerned with "directed activity, not premature realization," and this is the morphologic approach. Our naïvely selected section of reality, the landscape, is undergoing manifold change. This contact of man with his changeful home, as expressed through the cultural landscape, is our field of work. We are concerned with the importance of the site to man, and also with his transformation of the site. Altogether we deal with the interrelation of group, or cultures, and site, as expressed in the various landscapes of the world. Here are an inexhaustible body of fact and a variety of relation which provide a

⁵⁸ A. L. Kroeber, *Anthropology* (New York, 1923), pp. 180-193, 502-503, scrutinizes the *ex parte* nature of environmental tenets in their relation to culture.

course of inquiry that does not need to restrict itself to the straits of rationalism.⁵⁹

⁵⁹ Clark Wissler, *The Relation of Nature to Man as Illustrated by the North American Indian*, *Ecology*, Vol. 5, 1924, pp. 311-318. P. 311: "While the early history of the concept is probably lost to us forever, there are not wanting indications that the ecological idea was conceived in the same atmosphere as the theory of design, or of purposeful adaptation. However that may be, the effort on the part of the later professors of ecology has been to eschew all such philosophies except the fundamental assumption that plants and the rest of nature are intimately interdependent one upon the other." Thus "the anthropologist is not only trying to show what all the forms and forces of nature have done to man, but even with more emphasis what man has done to nature" (p. 312). This definition of anthropology includes a very large part of the social field, and is also a good definition for geography. At present anthropology is the study of culture per se. If our studies of man and of his work have large success in synthesis, a gradual coalescence of social anthropology and of geography may represent the first of a series of fusions into a larger science of man.

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Foreword to Historical Geography

These remarks are directed to the nature of historical geography and to some of its problems. By preference I should present data and conclusions from my own work in Mexico. On second thought, however, I am moved to do what has been done so often in the annual address before this body: to set forth in some manner a confession of the faith that has stood behind one's work.

It is obvious that we who call ourselves geographers do not at present understand each other very well. We have more fraternal feeling of belonging together than common intellectual ground on which we meet freely and easily. We can hardly claim to be getting our chief intellectual stimulus from one another, to be waiting impatiently on the research of colleagues as needed for our own work. We are of various minds as to the fields in which we are engaged. So long as we are in such a condition of uncertainty about our major objectives and problems, attempts must be made from time to time to give orientation to ourselves along a common course.

AN AMERICAN RETROSPECT

This will not be another design for the whole of geography, but a protest against the neglect of historical geography. In the nearly forty years of existence of this Association, there have been but two presidential addresses that have dealt with historical geography: one by Ellen Semple and one by Almon Parkins.¹

Annals of the Association of American Geographers, Vol. 31, 1941, pp. 1-24. Presidential Address given at the annual meeting of the Association of American Geographers, Baton Rouge, Louisiana, December, 1940.

¹ Ellen Churchill Semple, *The Influence of Geographic Conditions upon Ancient Mediterranean Stock-raising*, *Annals Assoc. Amer. Geographers*, Vol.