PHYSIOGRAPHIC SUBDIVISION OF THE UNITED STATES

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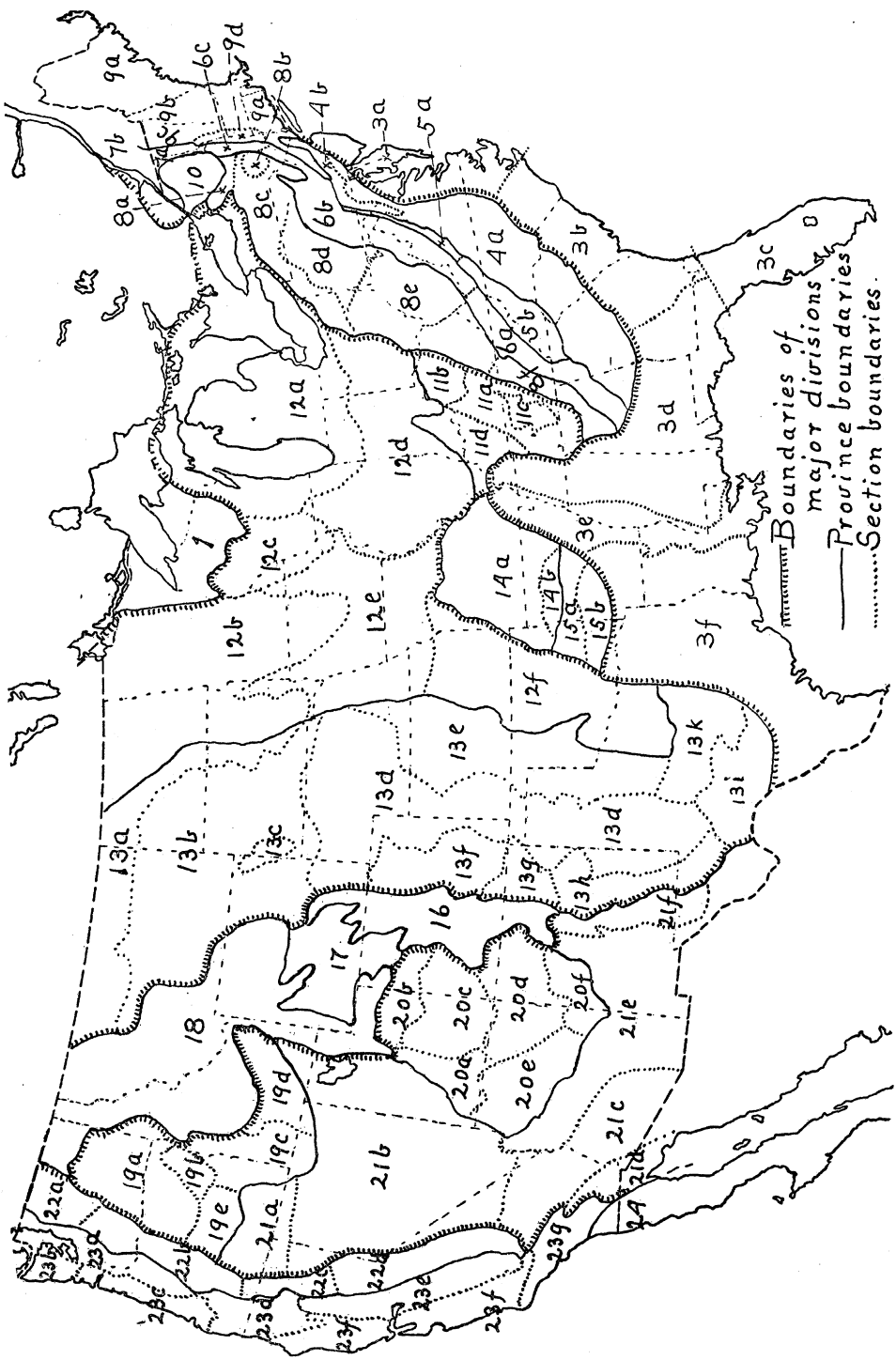
Communicated by W. M. Davis, November 24, 1916

Various attempts at subdivision of the United States into physiographic provinces have been made, beginning with that of Powell.[1] The Association of American Geographers, recognizing the fundamental importance of this problem, appointed a committee in 1915 to prepare a suitable map of physiographic divisions. The committee consists of Messrs. M. R. Campbell and F. E. Matthes of the U. S. Geological Survey and Professors Eliot Blackwelder, D. W. Johnson, and Nevin M. Fenneman (chairman). The map herewith presented and the accompanying table of divisions constitute the report of that committee. The same map on a larger scale (120 miles to the inch) will be found in Volume VI of the *Annals of the Association of American Geographers*, accompanying a paper by the writer on the Physiographic Divisions of the United States. In that paper are given the nature of the boundary lines and those characteristics of the several units which are believed to justify their recognition as such. Though the above-named committee is not directly responsible for the statements there made, many of them represent the results of the committee's conferences. The paper as a whole is believed to represent fairly well the views of the committee, though in form the greater part of it is a revision of a former publication.[2]

The basis of division shown on this map, here reproduced, is physiographic or, as might be said in Europe, *morphologic*. The divisions are based on land forms, not on climate or vegetation. If subdivision were carried far enough on the same principle each unit of the lowest order would comprise but one physiographic type. In most cases this has not been done. Even the units of the lowest order generally embrace several types closely associated in their development.

The genetic classification of land forms is now generally familiar to geographers, even to those who do not use it. In this system physiographic forms are classified according to their histories. Forms which result from similar histories are characterized by certain similar features, and differences in history result in corresponding differences of form. Generally the distinctive features which are important in a genetic classification are also obvious to the casual observer, but this is not universal. Thus a maturely dissected plateau may grade without a break from rugged mountains on the one hand to mildly rolling farm



PHYSIOGRAPHIC DIVISIONS OF THE UNITED STATES

lands on the other. So also, forms which are not classified together may be superficially similar; for example, a young coastal plain and a peneplain. Hence this map, which distinguishes physiographic types based on a genetic classification, does not in all cases make the distinctions which are most obvious to the casual observer. On the whole however, this discrepancy is not great. A very large proportion of all the boundaries shown on this map are familiar features. To have based the divisions purely on superficial features in proportion to their magnitude, would not have resulted in the making of units suited to scientific treatment.

Important physiographic differences between adjacent areas are, in a large proportion of cases, due to differences in the nature or structure of the underlying rocks. Where this is the case the two areas are distinguished on the geologic as well as the physiographic map. Distinctions based on geologic age also correspond to physiographic distinctions where the forms are so recent as to be in their first erosion cycle, as is generally the case with sheets of glacial drift. When these facts are remembered, it is not surprising that a large proportion of the boundary lines shown on the accompanying map are also geologic lines.

The segments here presented are of three orders, called respectively major divisions, provinces and sections. The basis of distinction among coördinate units is very much the same in all the orders. On the whole it may be said that contrasts in structure are stronger and more general between adjacent major divisions than between adjacent divisions of lower orders. Naturally also, the degree of topographic homogeneity is greatest in the units of the lowest order, but the reasons for calling one area a major division and another a province or a section are not clearly defined.

The degree of homogeneity in the several divisions of the same order is not in all cases the same. Homogeneity is strong in the Dissected Till Plains (12-e) which are practically everywhere submaturely dissected plains of moderate relief; also in the Snake River Plain (19–d) which is everywhere a young lava plain. On the other hand, the East Gulf Coastal Plain (3–d) is a heterogeneous area, for it grades from a young marine plain with undeveloped drainage near the coast to a maturely dissected, belted coastal plain farther inland; this case illustrates the inclusion of several types in one section by gradation, where no good dividing line is known, and where practical convenience requires that the types be considered in their mutual relations. Again, the Nevada Basin (21–b) comprises isolated mountain ranges (probably dissected block mountains) separated by aggraded desert plains; here

is an intimate intermixture of several types which are, however, so related genetically that both are accounted for by the same history. Indeed, while this work has no direct reference to teaching, there is something almost final about the requirement that a province or section should be a suitable unit for scientific treatment. This is quite as necessary from the standpoint of government surveys as from that of the university.

The committee distinctly disclaims finality for this work. With further investigation and more exact mapping some of the boundary lines here given may be shifted. The lines on this map were located by aid of the largest scale topographic and geologic maps available. Parts of the country are, however, imperfectly mapped, hence, with respect to exact plotting, the values of the several lines are unequal. All are necessarily generalized. As the result of future studies it may well be that the rank assigned to some of the units will be changed. Units of still lower orders will of course be made. Above all, the presentation of this map is not intended to preclude the use of other kinds of physical divisions like those of Supan, De Martonne, Herbertson, or Dryer. It is believed, however, that for a map of physiographic divisions, the main features of the one here presented will not be greatly changed.

The uses of such a map are of two general classes, (1) for scientific (explanatory) description, and (2) for comparative studies with other geographic elements. In the former, physical features are looked upon as the product of geologic processes, in the latter they constitute factors or conditions of life and human activity. In the former aspect they are an effect; in the latter a cause. The potency of such causes can only be known when statistics of population, agriculture and industry and even politics are graphically shown with due respect to natural units. It is plain that if matters statistical are to be represented on a map of natural divisions, and things human are to be discussed in terms of their physical setting, the value of the relations discovered will depend largely on the character of the natural divisions and their proper delimitation.

In the following table the names of major divisions are printed in italics; the provinces are numbered, and the sections lettered. The province number and the section letter correspond to those on the map.

Table of physiographic divisions of the United States

Laurentian Upland.—

1. Superior Upland

Atlantic Plain.—

2. Continental Shelf
3. Coastal Plain: (a) Embayed section; (b) Sea Island section; (c) Floridian section; (d) East Gulf Coastal Plain; (e) Mississippi Alluvial Plain; (f) West Gulf Coastal Plain.

Appalachian Highlands.—

4. Piedmont province; (a) Piedmont Upland; (b) Triassic Lowland.
5. Blue Ridge province: (a) Northern section; (b) Southern section.
6. Appalachian Valley province: (a) Tennessee section; (b) Middle section; (c) Hudson section.
7. St. Lawrence Valley: (a) Champlain Valley; (b) Northern section.
8. Appalachian Plateaus: (a) Mohawk section; (b) Catskill section; (c) Allegheny Plateau (glaciated); (d) Allegheny Plateau (Conemaugh section); (e) Kanawha section;* (f) Cumberland section.
9. New England province: (a) New England Upland; (b) White Mountain section; (c) Green Mountain section; (d) Taconic section.
10. Adirondack province.

Interior Plains.—

11. Interior Low Plateau:† (a) Highland Rim Plateau; (b) Lexington Plain; (c) Nashville Basin; (d) not named.
12. Central Lowland: (a) Eastern Lake section; (b) Western Lake section; (c) Wisconsin Driftless section; (d) Till Plains; (e) Dissected Till Plains; (f) Osage Plains.
13. Great Plains: (a) Missouri Plateau (glaciated); (b) Missouri Plateau (unglaciated); (c) Black Hills; (d) High Plains; (e) Plains Border; (f) Colorado Piedmont; (g) Raton section; (h) Pecos Valley; (i) Edwards Plateau; (k) Texas Hill section.

Interior Highlands.—‡

14. Ozark province: (a) Salem-Springfield plateaus; (b) Boston Mountains (plateau);
15. Ouachita province; (a) Arkansas Valley section; (b) Ouachita Mountains.

Rocky Mountain System.—

16. Southern Rocky Mountains (to be divided into sections).
17. Wyoming Basin.
18. Northern Rocky Mountains (to be divided into sections).

Intermontane Plateaus.—

19. Columbia Plateau: (a) Walla Walla Plateau; (b) Blue Mountains; (c) Payette section; (d) Snake River Plain; (e) Harney section.

* Likewise part of the Allegheny Plateau.

† In the report of the committee this is called the Highland Rim Province. Messrs. Campbell and Matthes do not concur in the exclusion of this entire province from the Appalachian Highlands. They would divide it, and assign the eastern half to the Appalachians.

‡ In the report of the committee this is called the Ozarkian Highlands.

20. Colorado Plateaus: (a) High Plateaus of Utah; (b) Uinta Basin; (c) Canyon Lands; (d) Navajo section; (e) Grand Canyon section; (f) Datil section.
21. Basin-and-range province: (a) Oregon lake section; (b) Nevada Basin; (c) Sonoran Desert; (d) Salton Trough; (e) Mexican Highland; (f) Sacramento section.

Pacific Mountain System.—

22. Sierra-Cascade Mountains: (a) Northern Cascade Mountains; (b) Middle Cascade Mountains; (c) Southern Cascade Mountains; (d) Sierra Nevada.
23. Pacific Border province: (a) Puget Trough; (b) Olympic Mountains; (c) Oregon Coast Range; (d) Klamath Mountains; (e) California Trough; (f) California Coast Ranges; (g) Los Angeles Ranges.
24. Lower Californian province.

[1] An excellent account of these attempts has been given by Joerg, W. L. G., *Assoc. Amer. Geogr., Annals*, 4, 1914 (55–84), 22 maps.

[2] Fenneman, N. M., *Assoc. Amer. Geogr., Annals*, 4, 1914 (84–134), 3 maps.

ON THE COMPOSITION OF THE MEDUSA, CASSIOPEA XAMACHANA AND THE CHANGES IN IT AFTER STARVATION

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Communicated by A. G. Mayer, December 13, 1916

Cassiopea may be divided into three distinct parts; mouth-organs, umbrella and velar margin. Since these three parts differ not only morphologically, but also in their absolute weights, as well as in the relative amount of cellular and non-cellular constituents, it was thought desirable to study the normal growth of these parts in order to determine whether the starving Cassiopea loses weight uniformally or whether the loss is dissimilar in the three parts concerned. A large number of observations were also made on the undivided Cassiopeas.

The observations made on the normal Cassiopea may be summarized as follows: (1) Relative weights of mouth-organs, umbrella and velar margin differ somewhat according to the size of the entire body. (2) The water content of the entire body, as well as of different parts, is practically identical throughout the animal's life cycle, so far as followed. (3) The percentage of nitrogen in the solids is highest in the smallest medusa, and the values decrease progressively with increasing body weight. The percentage of nitrogen is highest in the velar margin and decreases in the mouth-organs and umbrella in the order named.