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## THE CULTURE VALUE OF PHYSICAL GEOGRAPHY.\*

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For the purpose of discussion, the title may be paraphrased in the form of two questions. Has physical geography any culture value, and, if so, what is it? The answers to these questions depend entirely upon our definition of culture.

A well known dictionary defines culture as "The training, development, or strengthening of the powers, mental or physical, or the condition thus produced; improvement or refinement of mind, morals, or tastes; enlightenment or civilization." A broad and comprehensive definition, surely; but an encouraging one because it is so broad. If physical geography can do any of these things or produce any of these conditions, then it has a culture value.

Does it strengthen the mental powers, and, if so, which ones particularly? As an informational study it is unsurpassed. Its field is so broad that it touches all the other sciences intimately and draws upon them so largely to explain many of the phenomena with which it deals that the good geographer must also be versed in astronomy, physics, chemistry, geology, and zoology. Nor does it touch the physical sciences alone; for it comes into contact with the less exact sciences of sociology, civics, and economics. History and even literature, both sedate and romantic, contribute their quota to its understanding and in turn receive their share of interpretation and explanation.

It is not necessary to illustrate extensively how physical geography gives and takes with the other sciences. As a matter of fact there is only one *science*; and it does not matter whether we teach the nebular hypothesis as astronomy or physical geog-

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raphy. Nor does it matter whether we call Torricelli's experiment physics or physical geography. To know how a fish breathes or how iron rusts is quite as important to the geographer as to the biologist or the chemist.

But why should the sociologist, the publicist, and the economist know of physical geography?

A sociological experiment of recent date is the attempt to re-populate Palestine by encouraging the Jews to return to the land of their forefathers. Within a few days I have read that funds are being collected to purchase and plant trees in that dry country in order to bring rain to it and make it habitable for a large population. If the promoters of this scheme knew, as the geographer knows, that the lack of trees is the *result* and *not the cause* of the lack of rainfall and that Palestine must ever remain an arid country on account of its location and of its winds, the futility of the scheme would be at once apparent.

Again, the tide of immigration which is now sweeping over our eastern shores and congesting the cities of our northern Atlantic seaboard is a matter of concern to our publicists. To turn this tide toward the open lands of the west and the undeveloped areas of the south seems plausible enough; but those who are to shape its course must know just where to direct it and why they do so, else it will come surging back again from desert lands and fields which cannot absorb it. It is the province of the geographer to inform the publicist where to direct his energies, and the publicist must become a geographer to the extent of knowing why.

That the student of history must be a geographer would seem hardly necessary to prove; yet one has but to read some of the most approved text-books of history to know how adequate, not to say how lame, they are in their attempts to show the geographic influences upon the history which they record.

If the student of history would understand why the Russian Empire is so large, while the countries of south-western Europe are so small, he must know that no natural barrier exists to divide the great plains which stretch from the Arctic ocean to the Black sea. To know the true cause of the downfall of Poland, he must know that it was physically impossible for two nations to exist with no natural division in that great plain from the Ural mountains to the river Vistula. Likewise, it was impossible that two nations could exist in America upon the plains

which are not divided from the Great Lakes to the Gulf of Mexico, nor from the Appalachians to the Rockies.

The annual rise of the Nile in Egypt is familiar to all students of history, but is it too much to say that the majority of them know as little of its cause as did the ancient Pharaohs? Perhaps they are told that it is due to the advance of the equatorial rains over the upper part of its basin; but, unless they understand the causes of equatorial rains and why they advance, they must fail to appreciate as fully as they might one of the most remarkable and at the same time one of the most reasonable consequences of the earth's globular form and of its inclined axis. To know that the Nile rises and to know that it has risen annually since the days of Seti and Rameses is one thing; but to understand how and why it must continue to rise so long as earth and sea and sky shall endure is another and greater thing.

In literature a knowledge of physical geography is necessary to understand and appreciate many of its finest productions. Who can appreciate fully the younger Pliny's description of the eruption of Mt. Vesuvius or Bulwer Lytton's "Last Days of Pompeii" unless he knows something of the causes of volcanic eruptions and of their attendant phenomena?

As an informational study, then, physical geography may claim to contribute largely to that improvement and refinement of mind which we have stated as characteristic of culture.

We may now ask, is physical geography a disciplinary study? Does it strengthen the mental powers as do mathematics or an inflected language? I think it is not claiming too much to state that some of the problems to be solved in physical geography are quite as valuable in a disciplinary way as a proposition in geometry; and they are quite capable of being cast in the familiar form of hypothesis, argument, and conclusion.

To illustrate: Given the broad coastal plain of the Carolinas. Prove that it was once a sea bottom, that its layers of sand, gravel, and clay are the waste of the land washed down from the adjacent continent, and that they have since been uplifted to form a new land surface.

To prove this proposition, the pupil must draw upon his previous knowledge of similar coastal plains just as the geometry student must draw upon his previous propositions to prove his statements. He must follow a logical sequence of events, step

by step, and he must finally get back to the axioms, the self-evident truths of geography based upon his own observations and experience. So too, his definitions must be quite as exclusive and precise as those of the geometry student and his terms just as technical.

If we compare physical geography with an inflected language, we may say that it has its own peculiar vocabulary, its inflections, and its conjugations. It is quite as necessary for the student of physical geography to collect a stock of words peculiar to that science as for the Latin or Greek student to know the meaning of the words he uses; and, what is more, he must learn to know the *thing* by its *name* regardless of an equivalent. A teacher once told me that when I began to *think* in Latin, I would begin to know Latin. So the student will begin to be a geographer when he begins to think in terms of the technical words of that science. Thus, if we say that a *belted coastal plain* is a land surface lying between an *oldland* upland and the sea, that it has a *cuesta* which separates the *coastal lowland* from the *inner lowland*, and that upon the *cuesta* is a *divide* which separates the *consequent* streams of the *outer lowland* from the *obsequent* streams which flow down the *in-facing slope* to the *subsequent* stream which has worked out its valley upon the less resistant rocks of the *inner lowland*, we have given a description which would be "Greek" to the layman but which ought to be perfectly intelligible to the physical geographer, not only because he knows the technical terms but because he has a mental picture of just what has taken place to bring this land form to its present condition.

Land forms may be classified just as definitely as Latin verbs are classified into their four conjugations. Thus, we speak of *narrow*, *broad*, *belted*, and *embayed* costal plains, of *block*, *folded*, *domed*, *subdued*, *worn-down*, and *embayed* mountains, and of *undissected*, *sub-maturely dissected*, *maturely dissected*, and *worn-down* plains. The classifications of land forms are not arbitrary, as is the case with Latin verbs. They are based upon logical differences which are consequences of their age and of the processes of nature which have been at work upon them.

If, now, we grant that physical geography can give the pupil a fund of valuable information and that it can discipline him in scientific habits of thoughts, how can it develop his creative

powers? To create anything he must have imagination. Does physical geography develop the imagination?

It seems to me that a large part of our equipment of maps, globes, pictures, models, and special apparatus is intended to do just that thing. Except for instruments for direct measurement, the whole of our apparatus consists of devices for representing the things we are studying. What is a topographic map but a device for helping the student to form a mental picture of a bit of land surface? We cannot bring a mountain into the class room, nor can we always take the class to a mountain: so we show a picture of the mountain, we make a model of it, we study a contour map of it, we draw a section of it, and then we ask the pupil to imagine what it really looks like. If we ourselves will but recall our impressions when we first saw the mountains, the sea, the Great Lakes, or the Great Plains of the west, we can appreciate how far short of the truth were the pictures of them which we had formed in imagination. Physical geography can do much, however, especially in these days of good apparatus and profusely illustrated text-books, to bring the imagination nearer to the truth.

In the analysis of a land form, the student must picture to his mind all the stages through which it has passed. He must create for himself the scenes which attended its progress through elevation, dissection, tilting, folding, re-submergence, and perhaps a re-elevation, glaciation, and volcanic changes—all these and more, until the present form is attained. Then he may go on in imagination and predict its possible future. His speculation will not be idle, because he must draw upon every resource of his knowledge and experience and out of these materials create a fabric which shall be coherent, consistent, and plausible. There need be no fear that he will carry his speculations too far, because, if he gets beyond the bounds of reason, the cold, hard facts of nature will quickly bring him back. On the other hand, when he comes to know that what he has imagined is quite possible and that he has created something in his mind that is actually duplicated in nature, he gains in self-confidence and therefore in mental power.

I have found beginners to be very diffident about hazarding an opinion as to why certain things are so. They seem afraid to give a reason, unless they remember to have seen one given in the text-book. But I encourage them to give every one, pos-

sible or impossible, which they can think of. Of course there are some wild guesses, but there is some good thinking too; and when several of them find that they have thought rightly, there is a distinct gain of power.

Someone has said that a miner can see no farther than the point of his pick. This is true of his physical sight; but it is his creative imagination which makes him keep on swinging his pick until his efforts are rewarded by the pure gold.

Physical geography has so many problems of varying degrees of difficulty that it is capable, when properly presented, of developing, improving, and refining the creative imagination, and thereby the powers of self-reliance, productive thinking, and sound judgment.

Self-reliance is probably the greatest power to be gained by laboratory work. The other powers are developed by it too, and much information is given, but the greatest gain and the one most characteristic of such work is the confidence in himself which the student develops rapidly when he can handle the tools of the science.

The same diffidence exists here that we find in the chemical and physical laboratories—the same fear of possible failure that makes us all hesitate to attempt something which we have not done before. But, if we can only be induced or even compelled to make the attempt, the exhilaration of increased confidence will repay many fold for the disagreeable sensations of the first plunge.

The ingenuity of the New England Yankee is proverbial; and his success in meeting conditions in every land and clime is largely due to his supreme confidence in himself. Call it conceit or self-sufficiency, if you will; but, nevertheless, this power has enabled him to adapt himself to his surroundings in every part of the earth, to do what any other man can do, and to do it just as well until he finds a way to do it a little better.

He lived in a land where nature imposed hard conditions, but at the same time a diversity of conditions of soil, and climate, of land and sea, and of mountain, river, and plain; and, if he was to live at all, it was by taxing every resource of mind and body to wring from nature the food and shelter and reasonable safety of life which every man must have. If he had been content to confine himself to the methods which he or his forefathers already knew, he would soon have perished from the

earth. But the land of New England was a veritable laboratory; and, when he had exhausted its possibilities, he went out and applied what he had learned to the more fertile fields of the west.

Now the physical geography laboratory can be made to do for the student what New England did for the Yankee. We can present to him there a variety of conditions which will tax his ingenuity to meet and we can graduate those conditions so as to develop his powers without discouraging him.

The most impressive thing to a teacher, when he first puts a class into the laboratory, is its helplessness. The pupils may be able to recite ever so glibly from the text-book; but, give them some contour maps, some small globes, or some specimens of rocks and minerals and let them study them for a few minutes and then ask them what they have learned. Then ask a few leading questions and see how much they *can* learn. Your surprise will be of a different kind. After a few days, give them something different, and you will find that some of the helplessness has disappeared. If you will keep this up for a year, you will find yourself asking fewer questions, and you will find the pupils going at their problems with the air of veterans. They will not all do it, and some of them may have to come back next year and try it over again. But, did you ever notice the superiority of a last year's "failure," so-called, over one of the normally bright pupils who is taking the subject for the first time? It may not be universal, but it is apparent enough in many cases to make you believe that your work on the "failure" was not all in vain, even if he didn't pass his examination.

Laboratory work in physical geography has a value peculiar to itself aside from that contained in the mere subject matter. It is capable of training the powers in a different way from chemistry, or physics, or biology, or manual training. It is not antagonistic to any of these, but claims a place *with* them in developing the powers. It requires a certain amount of manual skill, particularly in drawing, it draws upon the other sciences to answer many of the questions which arise, and then it adds something of its own which the others cannot give.

This may be said of physical geography as a whole, and not only of its laboratory work. It is distinctly a *science*, and as such is capable of developing and refining the powers of the mind as no amount of manual training can do. To place it

on a par with *any* number of hours of shop work and drawing, where no reading or study outside of school hours are required, is to rob it of its virtue as a pure science; and to attempt to substitute for it an equivalent of American history in a so-called "Scientific" course is absurd.

Can physical geography arouse any enthusiasm? Any study will arouse enthusiasm just in so far as the pupils can be made to feel that it touches them in their daily life and experience. So, if we can make them feel that physical geography deals with those things with which they are in daily contact, we can arouse an intense interest and create a desire on their part to know more of those things.

Most of them have very little idea, when they first come to the class, of what physical geography is "about," as the expression goes. But, if we can show them that it is about the very ground they walk on, about the air they breathe, about the food they eat, and about the thousand and one things that go to make up their physical environment, then we can look for a large development of enthusiasm.

They have not traveled widely, and it is difficult to get up much interest in what they have not seen; but, as a matter of fact they have seen more than they think they have. For example, it is hard to get them interested in the belted coastal plain of southern New Jersey—just a bit of land along the Atlantic coast, with some features which they must learn, but not particularly interesting if they do not happen to live there. If, however, we can show them that Cleveland is located upon a similar bit of land, that southeast of the city is the cuesta which they can see from the class room, that the building stands upon the inner lowland, that the divide is just beyond Akron, and that another cuesta rises gently toward Niagara Falls, then the New Jersey plain acquires a new interest and they are anxious to study it in order to understand the Cleveland plain.

Again, the Glacial Period seems a remote and intangible thing until we bring it home to Cleveland, and then it becomes a very real thing when we point out what it has done here.

So we might go on with numerous examples, but further illustration is not necessary to show that, if we will only bring these things home and make them real, physical geography is capable of creating a desire to know not only Cleveland and its vicinity but to know other parts of our own continent and other



continents and to know how and why the people who inhabit them live as they do.

Physical geography has been defined as the science that treats of the physical features of the earth which influence the manner in which man lives upon it. The last part of the definition, which shows the intimate human relation of the subject, is the strongest argument for continuing to include physical geography among high school studies.

In an address before the National Geographical Society, about a year ago, upon the moral and material aspects of geographical explorations. Gen. A. W. Greely said "The growth development, and ultimate limitation of nations are largely influenced by, if not entirely due to geographical environment. The location of great centers of agriculture and commerce, of special industries, mining and stock raising, is the outcome of careful exploration of the special economic resources on which their success depends. \* \* \*

"The work of geographical exploration has usually passed through three distinctive phases: First, commercial purposes; second, advancement of knowledge; third, scientific explorations. Prolific as have been the earlier stages, it is the last named which has been the most potent force in the development of America, especially in the past, and which is so rapidly changing Australia and Africa at the present time. All and any of these methods have been, it is believed, fully successful only so far as there have been conjoined therewith moral forces as adjuncts of physical efforts. \* \* \* The moral results are associated with the generous assimilation and liberal development of discovered regions, under conditions whereby the civilized world benefits in the aggregate, and primitive folk are raised higher in the scale of humanity. In such cases the natural resources of the country and the mental activities of the people are made to increasingly subserve the new regions involved and by reaction similarly improve the rest of the world. Intelligence, justice, temperance, tolerance, fair dealing, and educative methods along the higher moralities are essential qualities of the true explorer. Their practical and successful application is an important factor in the evolution from uncivilized materials of a modern state, so as to justify its admission to international comity."

Do not these splendid words of Gen. Greely, himself a noted geographer and a true explorer, bear eloquent testimony to the fact that geography has that quality of culture which tends to the improvement of mind, morals, and tastes, and to enlightenment and civilization?