

edge of geography from study of such pictures of the earth. He cannot possibly acquire such detailed knowledge of the whole of our country, for the labour is too great. Nor is it desirable to master the geography of any one of the unnatural divisions of Britain, such as counties or parliamentary districts; but it is quite possible to learn a good deal about the hills and valleys of a single natural division. The coast line emphasizes what the plains and hills have made clear—that, although the wearing power of water is comparatively uniform, the varying durability of the rock is the cause which determines the details in form of the shore.

This kind of knowledge cannot be gained from books completely, because the durability of a rock often depends upon the nature of the cement which binds its particles together. And this cement may be absent or changed in a distance of a few miles; so that the rock which in one place forms a hill or headland, in another place may form a bay or valley. Still it needs very little knowledge to be aware that the man who can read the main teachings of a geological map has mastered the main outlines of a country's physical geography.

I have never doubted that the reason why so many of the great geographers in past times have been geologists has been that the structure of the earth shows itself upon the surface, demonstrated in hill ranges, valleys, or mountains, intensified in clearness, so that the geographical features are manifest expressions of geological facts. The geologist in making his map has not only to observe the general features of the surface, but to walk over every portion of it, so as to be certain that there is no geographical fact whose geological cause is not clearly perceived.

I do not suggest that the student should delay learning geography till he has learned geology, but only that he should base his knowledge of the geographical map upon a knowledge of the geological map. This is a very different thing. In the kindred subject, physiography, it is not necessary to delay till a mastery has been attained of astronomy, physics, chemistry, geology, and biology, all of which contribute in some degree to an intelligent grasp of the processes of Nature's work now going on upon the earth's surface. The amount of geology which is necessary for a comprehension and reading of the geological