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The Merit of Geology

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In the nineteenth century the term geology had a very broad compass and included geophysics and geochemistry. In the twentieth century, this situation changed and geology splintered into its various sub-disciplines. This had unfortunate consequences, the most critical of which was that earth scientists as a whole forgot the central aim of their endeavor, namely the establishment of the history of our planet and those of similar bodies. History has become a dirty word, because it was believed that it dealt with singular unique instances whereas true sciences such as physics dealt with eternal general laws. This is not true. Knowledge cannot be compartmentalised and we do not ask ourselves what branch of knowledge we pursue, but what problem we try to solve. In case of understanding the behavior of our planet our central problem is to know how certain rock bodies have come to be where they are. To answer that question we must first know the shape of those bodies. Only one method allows us to do that: geological mapping in the largest sense. Geological mapping may indeed be assisted by a myriad of auxiliary methods, but its fundamental aims remain the same: to know what the shape of a given rock body is. While establishing that we also ask ourselves what that body is defined by: its composition and structure. These two questions are also answered in the field, naturally awaiting refinement in the laboratory indeed. But again, the fundamental question remains the same: what does it consist of and how are its various building stones arranged with respect to one another. Interestingly, such questions can only be answered if we also know how those building blocks have moved with respect to one another while constituting the rock body we are trying to map. Here, inevitably time comes into question and reminds us that we work in not a three-dimensional, but a four-dimensional world. While studying the constitution of a pebble and the constitution of a mountain or indeed the constitution of an entire rocky planet, our fundamental questions remain the same: what is its shape? what are its constituent elements? By the middle of the nineteenth century geology made it possible to correlate all rock bodies globally. By the end of that century we had fundamentally understood the structure of the continents despite the fact that we knew next to nothing of the oceans. With only a little more knowledge of the depths of the seas we understood by the end of the nineteen-twenties the basic history of motions within the continents. Plate tectonics emerged almost as soon as we learnt about the details of the oceanic structure after World War II. I have often been amazed how many elements of plate tectonics (not only continental drift) had been already worked out by geologists before the War. The only reason for that was the activity of individual earth scientists dedicated to understanding the shapes and histories of rock bodies of our planet.