[PDF] The Practical Geologist: The Introductory Guide To The Basics Of Geology And To Collecting And Identifying Rocks

Dougal Dixon - pdf download free book

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Description:

About the Author Dougal Dixon was a geology student in college and now is a well-known writer specializing in the earth sciences. He took part in the 1985 and 1987 British Open

University/Earthwatch expeditions to the Askja caldera in central Iceland. Previous books include *After Man: A Zoology of the Future, The New Dinosaurs, Man After Man,* and *Time Exposure.*

Chapter 1

WHAT IS A PRACTICAL GEOLOGIST?

Geology -- the science of the Earth. It is a study that incorporates all the other sciences and binds them together in one all-embracing subject.

Literature gives us some guides. In Saint Ronan's Well by Sir Walter Scott, written in 1823, Meg Dodds, the prickly landlady of Cleikum Inn, refers to those of her guests who:

"*rin uphill and down dale, knapping the chucky stanes to pieces wi' hammers, like sae mony road-makers run daft, to see how the world was made.*"

In A Study in Scarlet (1887), Sir Arthur Conan Doyle, speaking through Dr. Watson, lists Sherlock Holmes' accomplishments and his limitations. In the list we read:

"*Knowledge of Geology -- Practical, but limited. Tells at a glance different soils from each other. After walks has shown me splashes upon his trousers, and told me by their colour and consistence in what part of London he had received them.*"

Here we have two aspects of the science of geology -- the academic and the utilitarian. The former represents knowledge for its own sake, while the latter knowledge is turned to some creative purpose. Both aspects involve practical work -- going out to find the knowledge in the first place.

Observational geology such as this has a long history. Greek scholars such as Pythagoras (c 580-500 BC) and Herodotus (c 485-425 BC) both noted the presence of fossil seashells high up in mountains and drew the conclusion that geographies were very different in times past. This early surge of interest in geology vanished during the Dark Ages and did not surface again in the West until the Renaissance in the 15th century. At this time technology and the arts began to blossom, and the necessity of supplying the raw materials for these new activities led to an interest in the formation of minerals. In 1556 the German mineralogist Georgius Agricola published *De Re Metallica* in which he describes the formation of metal ores in veins in a manner that was well ahead of his time.

The observations made over the next century or two led to some erroneous theories. The presence of crystals in some igneous rocks suggested to Abraham Gottlob Werner (1749-1817), Professor of Mining and Mineralogy at Freiberg, that all rocks had been deposited from solution as a vast primordial ocean had evaporated. This view -- the Neptunian view -- became geological orthodoxy.

The value of fieldwork

Throughout history the observations of the Earth's structure and composition have been misinterpreted, and it is only by diligent field work and increasingly precise experimentation that the more realistic theories have been developed.

One of the pioneers of utilitarian geology was English canal engineer William Smith (1769-1839). During the course of his work he realized that the different layers of rocks through which he excavated his ditches and tunnels could be identified by the kinds of fossils that they contained.

Using this information, he was able to construct the first geological map and, with his book *Strata Identified by Organized Fossils,* initiated the science of stratigraphy.

Nowadays the classic study of geology has combined with such related subjects as meteorology, oceanography, astronomy, geophysics, and geochemistry, to become the all-embracing discipline of Earth Science. For the professionals, the practical work is done with highly sophisticated equipment. Drills penetrate the surface of the Earth and bore rock samples from deep within the crust. The structure of the underground rocks can be studied by setting off explosions and recording the patterns of reflected shock waves, analyzing the results by computer. Infra-red photography from aircraft and satellites can show chemical differences in vegetation that reveal the nature of the underlying rocks. Sonar waves bounced off the ocean floor can give resolute pictures of the landscape. Sensitive gauges can measure the electrical properties of soil and rocks, and determine if an exploitable water supply lies beneath. Instruments can detect tiny variations in the Earth's gravitational field which can suggest the presence of workable metal deposits. It is all a long way from hammers and mud stains.

With the great surge of 20th-century knowledge and the wealth of books on Earth Science -- at both the academic and the popular level -- it has become possible to learn all that is known about the nature and the workings of the Earth without moving from one's armchair. Yet practical geology for the amateur is far from dead. Studying the rocks as they outcrop and collecting new specimens will always add to the mounting knowledge of the Earth. And nothing can quite compare with the exhilaration of tramping up a deserted mountainside to observe the folds and faults in the exposed rock, or with the joy of splitting open a boulder to find a crystal of garnet or a trilobite fossil that has never before been exposed to the daylight.

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