Geology and the War.

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The geology of a country is one of the most important factors which determine the location of its cities, its various industries, its population both as to number and occupation, its political aspirations and possibilities, and its relation to the countries bounding it.

It is the geology of a country which determines its natural resources, and these have had a peculiar bearing upon the recent history of Germany. Very much of Germany's iron and coal and her petroleum and potash deposits lie close to her frontiers. This has compelled her to strongly fortify these frontiers, especially next to France, and for this reason the giving back of Alsace and Lorraine to France will be a great economic blow to Germany.

In the last analysis it was the geological factors that gave Germany her great commercial and political importance and which determined her plan of attack upon France and Russia.

A glance at the geological map of northern France gives the reason why Germany was compelled to attack France through Belgium if she expected to reach Paris quickly. The series of escarpments to the east of Paris were the best of natural fortifications. They were practically impossible to scale when well protected by Frenchmen and French cannon. The immortal Verdun, one of the gateways into France, was made such by the steep slopes on the west and the outlying ridges which could be easily fortified by the defending army. The rocky barriers of northeastern France were too much for the wonderful military machine of Germany. The geological "stars in their courses" were marshaled against the invading Huns and helped the gallant French. It was the geology of the region that made Paris so easily protected from the invading armies from the east. Its geological defenses are among the wonderful geological features of Europe.

In western Russia the geological features are of glacial origin. There are numerous lakes, extensive marshes and morainic ridges. The area is easily defended by an army well supplied with means for defense. "The Germans could not get past the Russian troops so long as they formed heroic fighting units instead of radical debating societies."

The retreat of the Russians was masterful. Their various positions were determined by the rivers, and the lakes and marshes formed other barriers to their foe.

The mountain passes of Galicia were the only practical ways into and out from the plains of Hungary on the east. The valley of the Danube was a most effectual barrier for Serbia until she was overwhelmed by the great armies of the Central Powers. The numerous mountain passes of the Balkan States, large and small, were alike helpful and harmful in offensive and defensive warfare.

The engineering feats of the Italian and Austrian troops as they fought in the high mountain barriers of their respective countries have won the admiration of the world. The wonderful bravery of these troops will ever be matters for historical comment like the defense of the immortal Greeks at the pass of Thermopylae.

How different would the political and economic history of the whole of southern Europe have been had the area been a great plain like much of Russia instead of the series of almost impassable mountain ridges.

It has been, it is now, and probably always will be mainly a geological question as to where many of the boundaries between countries will be located. It was thousands of centuries ago when the political history of Europe was largely determined. It was

"When you were a tadpole and I was a fish"

that the shores of the Paleozoic seas were very different from the present shore lines and thick sediments were deposited over the region that is now southern Europe, and it was much later that these sea beds were elevated and eroded into the mountains of today.

"The violation of Belgian neutrality was predetermined by events which took place in western Europe several million years ago. Long ages before man appeared on the world stage Nature was fashioning the scenery which was not merely to serve as a setting for the European drama but was, in fact, to guide the current of play into blackest tragedy. Had the land of Belgium been raised a few hundred feet higher above the sea, or had the rock layers of northeastern France not been given their uniform downward slope toward the west, Germany would not have been tempted to commit one of the most revolting crimes of history and Belgium would not have been crucified by her barbarous enemy."[1]

But what did the geologists do and what can geologists do in time of war? It is sure that, should there ever be another great war, the geologists would be a more important factor than ever before. They will be among the first of our scientists to be organized into an efficient working corps.

The following is an abstract of an article from "Economic Geology," July, 1918, entitled "The Geologist in War Times; the United States Geological Survey's War Work," by Philip S. Smith:

[1] Topography and Strategy in the War, Douglas Wilson Johnson.

"There are two hundred and sixteen members of the Survey in military service, one hundred and fifty of whom came from the topographer's branch. One of the Survey geologists in the Engineer Officers' Reserve Corps fills an important scientific post on General Pershing's staff that requires a knowledge of geology. One of the Survey topographic engineers was also assigned to General Pershing's staff, where he occupies a position that requires special knowledge of topographic engineering.

"As soon as war was declared every member of the Survey who could be spared took up war emergency work. They became members of various national committees necessary for the successful conduct of the war. The geologic branch was called upon to supply information concerning the mineral resources of the United States and of foreign countries. A systematic search of the United States has been made for the minerals which we have depended upon foreign countries to supply, and we congratulate ourselves upon the results of this search. Ores of manganese, chromium, tungsten, quicksilver and sulphur have been most sought. The results of the search for potash rewarded the Survey beyond expectations. There has been an attempt to bring consumers and producers of supplies closer together.

"Surveys containing topographic, geographic and geologic information have been made of the several cantonment districts. Different kinds of coal have been carefully investigated at the request of the Secretary of the Navy, and also for the War Minerals Committee. Over forty skilled topographic engineers have been sent to Europe. Camera mapping is being carefully studied.

"The water resources of the Survey, in addition to performing its routine work, has been called on to furnish much special information that is immediately pertinent to the work of the War and Navy Departments. In co-operation with the geologic branch, it furnished data concerning the camp water supplies of all the border States except those contiguous to Canada; made tests of the water and estimates of the quantity available at the sites of war industries plants to be erected in the eastern part of the country; reported to the Surgeon General's office on the quality of the water at thirty-three cantonments in twenty-three States; determined the quantity and quality of the ground water available at seven aviation camps; made a field survey of the water conditions along the Mexican border west of Nogales, Ariz.; made comparison of the quality of the water of European and American springs; made recommendations to solve the problem of contamination of the water supplies of the Kansas River by sewage below Camp Funston; and reported on available waterpower and quality of boiler water at Yorktown, Va.

"The war has emphasized the economic importance of geology in every branch of its science. It has done its work at home in the ways mentioned above, and on the battle front the geologist has been most important in determining the best possible places for camps, hospitals and the lines of defense."

May this emphasis not be forgotten. May the United States Government be always willing to contribute liberally to the Geological Survey for work in all of its departments. May the geologists themselves pursue all problems with the thought not only of developing their science but to promote the "general welfare of the people of the United States."