

## Geology in the Invasion of Normandy 1944

Prof. Fred Shotton<sup>1</sup>

SHOTTON, F.W. (1983). Geology in the Invasion of Normandy 1944. *Proceedings of the Shropshire Geological Society*, 3, 2-4. The importance of geologists in war planning was fully recognised by the British in World War II, and Prof. Shotton was engaged in the Royal Engineers as a Staff Officer - Geology, along with a number of other geologists. The team was engaged in one part of the overall strategy: mainly the study of the beaches over which men and equipment would have to travel. The task was to prepare maps of the French beaches, pinpointing the most suitable invasion areas.

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No war has ever been planned so meticulously as the invasion of France in 1944. The importance of geologists in war planning was fully recognised, and Prof. Shotton was engaged in the Royal Engineers as a Staff Officer - Geology, along with a number of other geologists. The team was engaged in one part of the overall strategy: mainly the study of the beaches over which men and equipment would have to travel. The task was to prepare maps of the French beaches, pinpointing the most suitable invasion areas.

Modern war strategy called for ports and landing strips, and the original idea was to capture Cherbourg and set up fighter airfields around it. However, Prof. Bill King pointed out that there were no flat areas in the highly folded Precambrian and Palaeozoic in the area around Cherbourg, and that in order to be able to make landing strips, the invasion forces would be better to go further east to the area of Trias and Jurassic. The disadvantage of this idea was that there was no port, so it would be necessary to manufacture 2 artificial ports (Mulberry harbours), to be established on the oolitic limestone of the Roche de Calvados shelf. The statistical chance of major storms from the east was estimated at 1 in 200, but in fact one harbour was destroyed by storm on the third day of the invasion!

The invasion was to take place at four points (two British, two American), and required meticulously accurate information of the ground. Beach mapping was done at 6 in. contours from series of aerial photographs showing states of the tide. It would only be possible to disembark when tide levels were low enough for the beach ridges not to retain pools of water, and this narrowed the

possibility of invasion down to only four days in a month and four hours per tide.

The team first requested continental holiday photographs from the public, not indicating that these should be for any specific area. They were particularly interested in photographs showing submerged forests and peat, so that their maps could show any dangerous ground.

The team also studied submerged forest beaches in Britain in order to find a counterpart on British soil. They selected Brancaster in Norfolk, which was closed off so that army exercises could be carried out there, and equipment tested.

Aerial photographs of the beach at Hastings, with its peat and clay outcrops, were studied, so that similar photographs of the French beaches could be interpreted as accurately as possible. On black and white photos, the peat shows up like seaweed, but it is necessary to have many sequences of pictures in order to show movement of beach material. The team ordered many air sorties over the European coast in order to obtain this information, but of course had to order pictures of twenty beaches each time, so that their particular interest could not be identified.

The team established that tracked vehicles could cross virgin peat so long as they were not within a previous vehicle's tracks, but wheeled vehicles could not cross unless there was at least 6" of sand cover. Experience at Brancaster showed that a track or crater in a sufficient depth of sand would fill in with the tide, but if clay was present beneath, and was punctured, it would well up and remain visible, sometimes for weeks or months.

The Germans progressively set up tripods of steel girders and mines along the Calais beaches, and about three months before the invasion, they

did this along the invasion beaches. This was fortuitous in that the tracks of the farm vehicles used for the work gave confirmation of the information which had been plotted on the maps.

Heavy storms can cover or uncover submerged forests. A storm in March completely changed the picture after the maps had been prepared, but it was possible to correct them quickly, using the techniques which had been established.

Prior to the invasion, commandos were sent to the beaches for beach samples in order to confirm the team's deductions.

The invasion strategy was a miracle of planning. The whole mapping process only took from September 1943 to June 1944.

As a postscript, the Mulberry harbour which was established on the invasion beaches still

remains, and has completely changed the character of the beach. It has caused the erosion of all the sandy material and, whereas the beach was popular with tourists before the war, it is now largely deserted.

The vote of thanks was proposed by Dr. Peter Toghill.

A LECTURE BY PROF. SHOTTON GIVEN  
FOLLOWING THE ANNUAL GENERAL  
MEETING OF THE SOCIETY ON  
WEDNESDAY 22<sup>nd</sup> SEPTEMBER 1982.

Chris Ing

Poster from the web site of the Lapworth Museum, University of Birmingham, advertising their special exhibition 2005-2006 on the 60<sup>th</sup> anniversary of the Normandy Landings.

# A Special Exhibition

## Science and the preparation for the D-Day landings

To commemorate the 60th anniversary of the Normandy landings, the Lapworth Museum of Geology is creating an exhibition of original maps, photographs, scientific reports, letters and other miscellaneous items, relating to the work of a leading scientist involved in the planning for D-Day.

Recently, the Shotton Geological Archive at the Lapworth Museum was found to contain a vast amount of information regarding the military work of Professor Fred Shotton MBE FRS. Shotton was a Major in the Royal Engineers, who advised the military commanders on the geological and geographical problems, pitfalls and solutions regarding the planning of the allied landings.



**BIGOT**  
TOP SECRET

APPENDIX F  
TO FIRST CDN. ARMY  
INT REPORT NO 1  
DATED 1 JUNE 44

Many of these original manuscripts were highly classified, *Top Secret* documents, and provide a rare glimpse of the little known, yet extremely important, work of scientists involved with the preparations for D-Day.