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A geophysical survey at Schlumberger's Val Richer residence: between archaeology and the history of science

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The Val Richer (Calvados, France) property, which became the family domain of Conrad Schlumberger, is recognised as being the place of origin of applied geophysics. During the summer of 1912, Conrad Schlumberger tested for the first time a new method designed to map out the electrical resistivity of the subsurface. These encouraging tests led the Schlumberger brothers to develop this type of prospection and to create first an engineering office in 1920 and then the Société de Prospection Electrique in 1926, the Compagnie Générale de Géophysique (CGG) in 1931, the Schlumberger Well Surveying Corporation in 1934, and Schlumberger Limited in 1956, which has become the largest multinational company in the oil service industry (Robin 2003).

A hand-drawn blueprint made by Conrad Schlumberger, which is well known in the geophysics community, describes this experiment (Fig. 1). It shows the electric field distribution together with a hand-written comment describing the difficulties encountered and the solutions retained.

Nearly 100 years after this founding experiment, a research project was initiated at the same place where Conrad Schlumberger's measurements were carried out, with its main objective being to discover the remains of the Val Richer abbey. The Schlumberger family residence is indeed built at the same location as this abbey, right in the heart of Normandy. As a consequence of the destruction resulting from the French Revolution, there are currently no remaining relics.

In 2014, the implementation of a geophysical study made it possible to unite two inseparable stories from Val Richer. By applying the principles developed by the Schlumberger brothers, it was possible to find the location of the abbey's religious buildings, which are now totally destroyed (Fig. 2). The interpretation of the geophysical survey, in the light of archival sources and current knowledge of the

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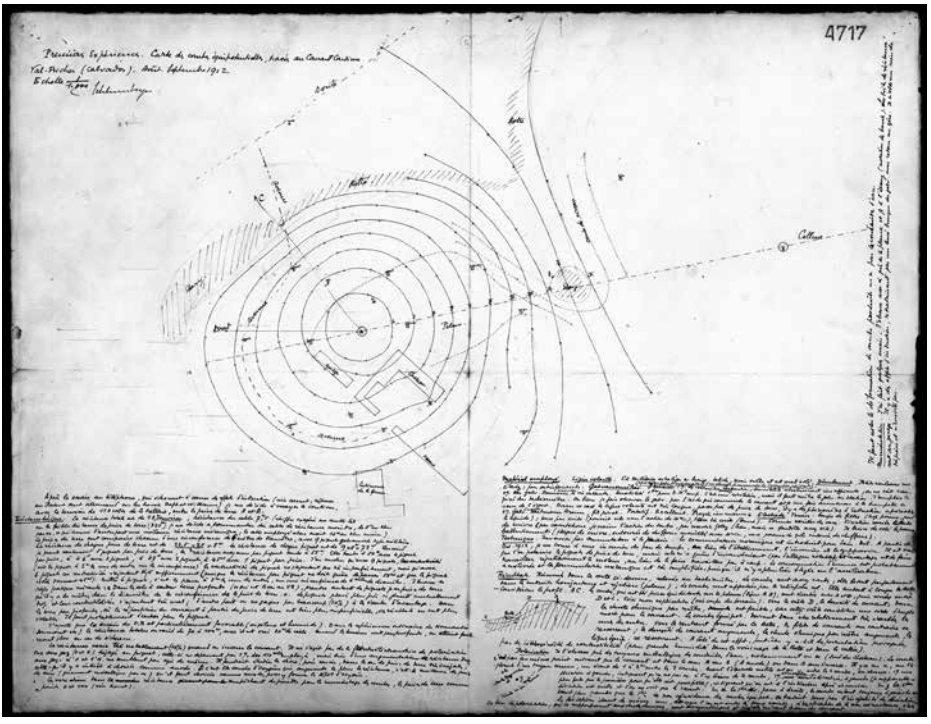

Fig. 1. First map of equipotential curves: Val Richer, August-September 1912 (Schlumberger 1912)

Cistercian abbeys of Normandy, has completely revived our vision of the Val Richer abbey and enabled an accurate outline of the plan of this monastic settlement.

In parallel with this archaeological study, it has been possible to analyse the 1912 blueprint to a level of detail which, to our knowledge, had never previously been achieved. A complete analysis of this account and associated drawings was carried out in order to transpose the solutions adopted by Conrad Schlumberger to the context of current knowledge and practice in resistivity survey. In particular, he described the type of apparatus, the type of cable, as well as the electrodes used. He also described signal acquisition problems, in particular induction phenomena related to the length of the cables as well as the contact resistance of the current probes. Finally, he described the results and tried to interpret the local anomalies observed.

There are thus two sections of Val Richer, *a priori* distant, which are recombined by this study (Fig. 3), demonstrating the usefulness of the multidisciplinary approach that was so well defined by Conrad Schlumberger, and that can readily be transposed, when needed, to applications in archaeometry.

"La prospection électrique rentre dans cette catégorie d'études mixtes qui s'appuient sur des notions très variées, ne sont ni chair ni poisson, et déplaisent aux chercheurs sagement spécialisés

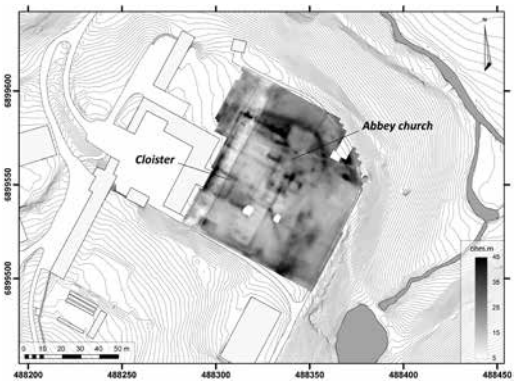

Fig. 2. Resistivity survey: Val Richer, June 2014

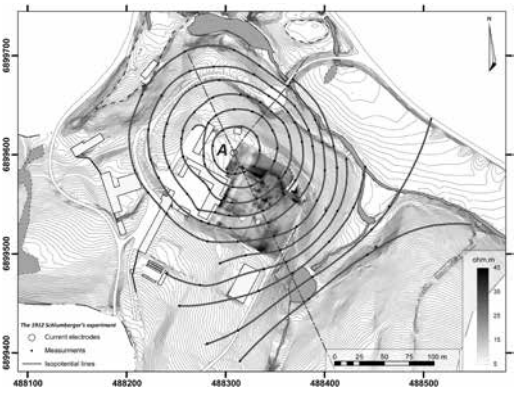

Fig. 3. Superimposition of the terrain elevation, building position, 1912 voltage contours drawn by Conrad Schlumberger and the 2014 resistivity map - Val Richer. For the complete figure, see Tabbagh Fig 1, 133 in this volume

dans un classique compartiment scientifique. En effet, il faut être un ingénieur mathématico-physico-technico-géologue, avec le goût de l'expérience et du grand air, pour aborder volontiers le problème. Le hasard qui m'a chargé d'un cours de physique dans une Ecole des Mines m'a logiquement presque forcé à rechercher pendant les longues vacances de l'ancien régime, les applications de la physique à l'art des mines en général et à la prospection en particulier. C'est ainsi que je me suis engagé en 1912 sur ces sentiers peu battus et que j'y ai progressivement entraîné plusieurs collaborateurs qui partagent aujourd'hui avec moi la bonne et la mauvaise chance. Des connaissances élémentaires suffisent parfaitement. Encore faut-il les avoir, ou désirer les acquérir, et cela ne doit pas être si fréquent puisque le domaine n'a encore que peu été étudié, malgré l'importance des perspectives ouvertes. Je tiens à rester un technicien qui va plus loin que l'étude du caillou."

Conrad Schlumberger, *Le puits qui parle*, Paris, 1921

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