Prehistoric archaeology and geology, a historical perspective

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Abstract. This paper examines the role played by Geology in the constitution of Prehistoric Archaeology as a scientific discipline. Geology was a tool for the establishment of its evidence, and a scientific model whose concepts, vocabulary and onomastics were directly imported from one discipline into the other. Despite the limits of its usage as sole evidence, Geology remains until today an irreplaceable companion to prehistoric archaeological research.

By the turn of the 19th century, Geology had accessed the status of a scientific discipline, and thus gained a unique prestige among the natural sciences (Rudwick, 2005, 2008). It became a powerful driving force for several disciplines such as palaeontology[1] and evolutionary biology[2], and even a key to the recognition of their scientific status. In prehistoric archaeology, geology constituted the very basis of a knowledge that it helped to found.

Early evidence for human antiquity was established in Northern France (Cohen & Hublin, 2017). From the 1830s, Casimir Picard (1838) then Boucher de Perthes working in the region of Abbeville, showed that the stratigraphy of the lower Somme river valley gave evidence to the contemporaneity of extinct animals and flint tools made by human hands; the succession of layers provided evidence for the relative antiquity of chipped vs polished flint artefacts, as belonging to two distinct epochs of human prehistory -- "Celtic" (Neolithic) vs "antediluvial" (Palaeolithic) epoch (Boucher de Perthes, 1847, 1857, 1864). Whereas French academic authorities were reluctant to admit Boucher's claims for the antiquity of Man, great English geologists such as Charles Lyell, Joseph Prestwitch, and Hugh Falconer travelled to the Somme valley in Abbeville to recognize and confirm their validity (Cohen, 1997; Cohen & Hublin, 2017). The word "*archéo-géologie*", was coined by Jacques Boucher de Perthes to name his own research: for him it meant a new way of looking at archaeological objects and their antiquity, in which geology had a central place. Eventually, Charles Lyell (1863) summarized this new body of knowledge in an important book intitled *Geological Evidences of the Antiquity of Man* in which he listed a number of significant discoveries made in France, in England and elsewhere, and recognized in Quaternary terrains the geological traces of glaciers which punctuated the period during which prehistoric Humans thrived in Western Europe.

Geology was not only a tool; it truly became a model for prehistoric archaeology. Beyond the uses of geology as evidence, Prehistory's methods and concepts were directly borrowed from geology: thus the constitution of a scientific language in Prehistoric archaeology used, as it had long been the case in Geology, the names of eponymous localities (such as Mousterian from Le

[1] Cuvier's first volume of his *Ossemens fossiles de quadrupèdes*, generally onsidered as the founding work of scientific palaeontology, opens with a « Géologie du Bassin de Paris ».
[2] Darwin's early training at Edinburgh and Cambridge was in Geology, and he recognized the influence Lyell's geological thinking had upon the constitution of his own evolutionary thought. See Sandra Herbert, *Darwin, Geologist*, Ithaca, Cornell University Press, 2005.

Moustier, or Magdalenian from La Madeleine, etc.) to establish a nomenclature of successive prehistoric levels; typical stone tools of these prehistoric cultures were used as stratigraphic markers, in the same way as “guiding fossils” were used in stratigraphic palaeontology (Mortillet, 1884). Similary, the succession of prehistoric industries in a vertical sequence (Mortillet, *ibid*.) illustrates the impact of geological methods and concepts upon the epistemological foundations of prehistoric archaeology.

Geological evidence eventually proved insufficient or even inadequate to address certain issues raised by prehistoric archaeological research, It could also be the occasion for mistakes, or even frauds: the Moulin Quignon jaw (Boucher de Perthes, 1864), whose antiquity was established by its sole stratigraphic position (Cohen & Hublin, 2017; Cohen, 2018), appeared later as a recent human bone which had simply been planted by workers at the bottom of a stratigraphic section. With the multiplication of finds, anatomical studies, which had been until then impossible because of the lack of fossil remains for comparison, could now take place over geological considerations.

However, geology still was, and remains today, essential to the stratigraphic study of sites, their interpretation and relative dating. Geological knowledge constitutes an essential framework for the study of prehistoric cultures, and is part of interdisciplinary research into human Prehistory. It is enlightening in what regards the exploration of shelters and decorated caves (Pigeaud, 2023), as it makes it possible, in particular, to study human actions, behaviours and artistic productions in relationship with mineral and geological materials specific to a given site. Geology is indeed today an irreplaceable companion for the prehistorian to study the material contexts of early cultures and art, and to explore the relationships of humans with their environments.

Approaching the history of prehistory from the perspective of its changing connections and articulations with geology and exploring the various collaboration of these two disciplines for more than a century and a half thus proves important and fruitful for science historians, as well as for scientists engaged in these two domains.

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