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Monsieur le Directeur Général, Monsieur le Vice-Président, Mesdames et Messieurs du Conseil d'Administration et du Conseil Scientifique de la Fondation Fyssen, Monsieur le Professeur Michel Brunet, Monsieur le Professeur Alain Prochiantz, chers Collègues et chers Amis,

It is with great pleasure that I am going to recall my scientific itinerary. With pleasure and gratefulness, towards the Fyssen Foundation, of course, but also towards all those who have always supported and followed me. I cant name them all, but they are all very present to my mind. I will first recall how I have made up my technological approach, then where I collected data and which way I analyzed them to shed light on the evolution of early hominids.

My beginnings in technology

I became interested in lithic technology because of the outstanding and generous way it was taught in the 70ies by Jacques Tixier at the *Institut de Paléontologie Humaine*. I soon became convinced that prehistoric technical production could only be studied in this perspective which had been initiated by Leroi-Gourhan. I followed his teaching at the *College de France* and had my first digging experience with his team at Pincevent, before to join Jacques Tixier –who was to become my PhD advisor- at La Faurélie (Dordogne) and Ksar Akil (Lebanon). This is how I came to be involved in the development of a "movement" with the objective to develop an analysis tool based on the technology approach. This objective was almost met at the beginning of the 80ies, and later became the success we know.

This first involvement in research was threefold: 1) I participated very actively in the setting up by J. Tixier of the *Préhistoire et Technologie* laboratory in 1980, of which I am still a member. 2) I co-wrote together with J. Tixier and M.L. Inizan a text book as part of the collection "Prehistory of knapped stones" which we created as well as the *CREP* association (*Cercle de Recherches et d'Etudes Préhistoriques*) which published the manual. This book evolved from the teaching of lithic technology we carried out at the Nanterre University and was meant for students and non-specialist researchers. It quickly became reference work in France and abroad, as shown by its different translations, new editions and now on line free access. It filled a gap in the developing technology approach, its concepts, methodology and terminology. 3) Since I had chosen to work on ancient industries right from my thesis days, it seemed to me most essential to study in depth technical data pertaining to lithic assemblages as the only way to characterize capabilities and describe the evolution of skills in hominids who became man's ancestors. It seemed to me that unlike later ones, those early productions were classified according to a system which gave too much weight to morphology, dimensions and pseudo-types unwillingly

produced by hominids. At this stage of their evolution, they undoubtedly used their mineral environment for their own benefit but in an opportunistic rather than masterly fashion as their level of technical skill remained limited. I was convinced that the conceptual and operational description of techniques and *chaînes opératoires*, of their rate of occurrence from rare to frequent, would lead to a better understanding of those first industries. They could be classified according to a technical logic without the earlier pitfalls of quasi-natural shapes and presupposed functions. My thesis which was published (1980a) a few months after I defended it, is an illustration of this approach.

In the field in East Africa

I was recruited by the French cooperation agency to be an assistant teacher between 1971 and 1973 at Tchad University where I started my Africanist carrier in education. After this first experience, Yves Coppens, whom I had met in Tchad, and Maurice Taieb opened the doors of East Africa and the plio-pleistocene period for me when they invited me to be part of the International Afar Research Expedition (IARE). They co-led it together with Donald C. Johanson in Hadar in the Ethiopian Afar region where renowned paleoanthropological findings were made as this is where the species *Australopithecus afarensis* -"Lucy"- was discovered. This is where I carried out my first two long field seasons, in 1974 (with Gudrun Corvinus) and 1976. During the second of these seasons, I discovered with the collaboration of geologist J.-J. Tiercelin small series of knapped stones in a conglomerate level dated undoubtedly at 2.6My. Despite a good number of publications (1977a, 1978a, 1980e, 1980f, 1980g, 1982a), this pioneering but premature discovery did not find a real echo..

From 1983 onwards, after defending my thesis, studying material for several years and writing articles and books, I returned to intense field work in East Africa. I created the Kenya Prehistoric Mission (MPK) and started excavation work at the Acheulean site of Isenya. At the time, I was focusing on the Acheulean and middle Pleistocene periods. Later, from 1987 when I began work on the Western shore of lake Turkana in Northern Kenya, I came back to the old Pleistocene/Plio-Pleistocene period while continuing working and publishing on Isenya Acheulean material. (1995b, 1995c, 1991a, 1988a, 1987a).

In 1987, Richard Leakey, then Director of the National Museums of Kenya, allocated the Western Turkana region to me to carry out archaeological studies. This area had not been explored at all as far as archaeology is concerned when I started working there. I set up a multi-disciplinary team, the West Turkana Archaeological Project (WTAP), and after several exploratory campaigns during which we discovered the oldest Kenyan sites known at the time (1996a, 1994a, 1992b), we started excavating various key sites extensively (2011b, 2003a, 2003b, 2003c). The WTAP is currently working on 10 complexes of plio-pleistocene sites dating between 3,3 and 0,7 million years. Over a hundred sites have been registered, one third of which have been excavated or test excavated. They document the main chrono-cultural periods of the African Palaeolithic age: Pre-Oldowan (3,3/3 Ma), Early Oldowan (2,4/2,2 Ma), "Classic" Oldowan (1,9/1,65 Ma), Early Acheulean (1,75 Ma), and Middle Acheulean (1,2/0,7 Ma). The main objective of WTAP is to show the behavioural evolution of hominids from the end of the Pliocene age until the middle Pleistocene in a given area and an environment reconstructed as precisely as possible. The characterisation of the *chaînes opératoires* allows for diachronic and synchronic comparisons at local level and in the Turkana Basin or even the entire East African region. Apart

from the need to constantly refine the chronostratigraphic context (2003b, 2010a), we intend to describe in more details the paleoecology of hominids, their food and habitat preferences (2013a, 2013b), and to contribute to the assessment of environmental change impact on bio-cultural evolution at a local and regional level.

Approaches…

Stone knapping is essentially a sensorimotor activity whether it is carried out by modern man or hominids who might or might not have shared our genus. This is why my technological studies have borrowed heavily from the concepts of cognitive psychology as they have been for instance codified in our field of research by J.Pelegrin (UMR 7055 of CNRS). This approach has greatly helped me to know considerably more about the behavioural evolution of man's ancestors. However I am well aware that this knowledge is very difficult to apply outside of the *sapiens* sphere, especially when I will come to work on the *habilis* species and/or the genus *Australopithecus*. This is why I have also studied technical behaviours of non-human primates. Recently I have been involved in a dialogue with primatologists which was initiated by young researchers from Cambridge University (2009b) and became since 2010 a proper network (Leverhulme International Network) initiated by my young colleague Ignacio de la Torre (University College of London), with the aim to link archaeologists and primatologists. This network allows for a regular exchange of field and experimental data. It is one of the rare attempts to compare the technical abilities of hominids and non- human primates, especially chimpanzes.

… and results

The Isenya site is a rich, high quality and virtually endless source of material for studying the technological behaviour of *Homo erectus*. The analysis of material from the Acheulean according to technological paradigms was very new at the time. After identifying technical activities through a description of *chaînes opératoires*, I could assess the level of technical knowledge using the *chaîne opératoire* as a tool for analysis, based on the notion of project (aim to be reached) and cognitive (knowledge, know-how) or motor (dexterity) parameters. I suggested with P.J. Texier (UMR 5199 du CNRS) that technical abilities of the fossil species *Homo erectus* in East Africa be assessed through an analysis of conceptual and operational scheme demonstrated in different *chaînes opératoires*, such as flaking of cores and shaping of bifacial pieces (1991b, 1995b). We were able to prove that complexity is a relative notion when applied to the conceptual and operational (1991a), and show the implications of introducing predetermination as a concept in a *chaîne opératoire* (1995c). I formalised my understanding of shaping during this same period (Chap. 3 in 1995a, 1999a, and 2009).

Technological analysis of material from Turkana sites contributed to a better understanding of hominids' technical activities (*Australopithecus* and first members of the *Homo* genus) based on a cognitive approach in the long time scale. In this way the level of competence of a group or an individual performance could be assessed, as well as the degree of variability in know-how (2006a, 2005a, 2000a, 1996b). In Lokakalei 2C (1999b, 2005b), with Anne Delagnes (UMR 5199 du CNRS), I was able to reveal that there existed as early as 2,3 My actual *débitage* carried out according to an organised operational scheme. This implies anticipation in the choice and handling of raw material, empirical understanding of the significance of the knapping constraints, and excellent

mastering of percussion. This type of *débitage* produces many flakes as demonstrated by our refits (i.e. by conjoigning the elements belonging to the same block of raw material). This greatly challenged the idea of a rustic and unproductive Oldowan which prevailed at the end of the 70ies, after the work of Mary Leakey on Olduvai was published, and ever since. This also strengthened the idea of variability if not diversity in plio-pleistocene industries from their very beginnings more than 3 millions year ago right up until the first sites of old Acheulean (1,75 My) : there is not one Oldowan, but Oldowans. I suggested this hypothesis at the end of the 90ies as opposed to one of uniformity and stasis put forward by other researchers. Mine appears to be winning the day but a lively international scientific debate is still on. Along the same line, I questioned the notion of evolution by "progressive complexification" during the Oldowan period. I was able to establish that conceptual innovation and material implementation do not necessarily progress at the same rate during technological evolution (2005a, 2009a). With Sonia Harmand (UMR 7055 and Stony Brook University), significant contribution to the study of behavioural space occupation by hominids was made, giving weight to the notion of local procurement of raw material and limited movements through a given area (2009a, 2011b). Lastly, recent field investigations of the WTAP, now directed by Sonia Harmand, will put back the appearance of the first lithic productions at more than 3 millions years ago (2013c). The technical properties of this lithic assemblage as much as its old age and the fact it is in spatiotemporal association with an *Australopithecus (A. afarensis* and/or *Kenyanthropus platyops*) will allow to write a new page of African prehistory.

In conclusion

Based on the many discoveries made in the field in Western Turkana by me and my team, my technology approach to lithic productions has had an international resonance and has influenced significantly research paradigms on behavioural evolution of man's hominid ancestors. A new scenario for human ancestry technical habits is on the verge of being written, quite different from the one prevailing when I started my research. Emphasizing the long time, the paleoanthropological diversity and the immensity of the east african territories, I have shown that behavioural evolution is as complex as the biological one. All along my career, I have tried and clarifed the cognitive processes that underpin the techno-cultural evolution of early hominids. The approach and objectives of my research work thus go hand in hand with those of the Fyssen Foundation. This may be best illustrated by the fact several young researchers who trained under me or joined me in the field were awarded post-doctoral or research grants by the Foundation, and for this, as well as for the international prize I have the honour of being awarded today, I am deeply grateful.