

Prehistory and Geomorphology in Northern Jordan: a Preliminary Outline

The information to be presented in this paper was obtained during the course of a survey carried out in September 1982, and completed in September 1983 by the RCP 438 team (*Recherche Coopérative sur Programme*, funded by the *Centre National de la Recherche Scientifique* of France). In 1982 the team consisted of: Jacques Besançon, Université François Rabelais de Tours (director of the mission); Lorraine Copeland, Institute of Archaeology, London; Francis Hours, CNRS, *Maison de l'Orient*, Lyon; Jean-Jacques Macaire, Université François Rabelais, Tours; with the addition of Paul Sanlaville, CNRS, *Maison de l'Orient*, Lyon, in 1983. Our aim was to see if the working methods which we had used since 1976 in Northern Syria with such good results could be applied to understanding the environmental changes further south¹. The problem is important, because the contributions of several authors to recent Symposia² suggested that the climate was unlikely to have changed in exactly the same way in the northern and southern areas of the Levant.

In Northern Syria we can construct a model for the evolution of the Pleistocene and Holocene, based on the integration of the geomorphology (i.e. the study of marine and continental formations) with the prehistory (i.e. the various prehistoric flint industries which these formations contained)³. After studying several North Syrian areas we were able to propose a chronological scheme applicable to the River Orontes⁴, the northern Nahr el Kebir in Syria⁵, and the Middle Syrian Euphrates⁶.

Briefly, four fluvial phases alternate with four marine transgressive episodes and these give the following succession from the oldest to youngest (Q = Quaternary, f = fluvial, and m = marine):

- QfIV : Sitt Markho Formation
- QmIII: Zaqrounian Shoreline⁷
- QfIII : Latamne Formation
- QmII : Jbailian Shoreline
- QfII : Ain Abou-Jema'a Formation
- QmI : Enfeo-Naamian Shoreline
- QfI : Ech-Chir/Jraimaqiye Formation (and Abou-Chahri Formation)
- QmO: Present sea-level

Given the difficulties in chronological correlations over widely separated regions, absolute dates of reference for this scheme are available at only two fixed points:

- 1) The reversal of magnetic polarity Matuyama/Brunhes, the end of the lower and the beginning of the Middle-Pleistocene which took place about 730,000 years ago, apparently occurs between QfIV and QmIII⁸.
- 2) QmO corresponds to the Holocene, with some subdivisions.

Therefore, the QfI formation was accumulated during the last pluvial, which is believed to begin some 75,000 years ago. The QfII can not be precisely dated.

As for the prehistory, an Early Acheulean, perhaps accompanied by an archaic industry without bifaces, is found in the QfIV and QmIII deposits. The Middle Acheulean occupies the time of QfIII and QmII. The Late Acheulean is present in the QfII Formations⁹. From the QmI onward, various typologically and technically interwoven industries occur and these represent the passage from the Late Acheulean to the Middle Palaeolithic¹⁰. The latter is usually included at the base of the QfI, but we know now that it begins earlier, in the QmI¹¹.

As mentioned above, our aim was to see whether this model

¹ J. Besançon in Sanlaville (ed.) 1979, pp. 121–135.

² Frey and Uerpman (eds.) 1981; Cauvin and Sanlaville (eds.) 1981; Bintliff and Van Zeist (eds.) 1982.

³ Besançon in Cauvin and Sanlaville (eds.) 1981, 146–153; Sanlaville in Cauvin and Sanlaville (eds.) 1981, 155–161.

⁴ Besançon *et al.*, 1978a, 1978b.

⁵ Sanlaville in Sanlaville (ed.) 1979, 7–28.

⁶ Besançon *et al.*, 1980.

⁷ For the identification of the marine formations, see Sanlaville 1977.

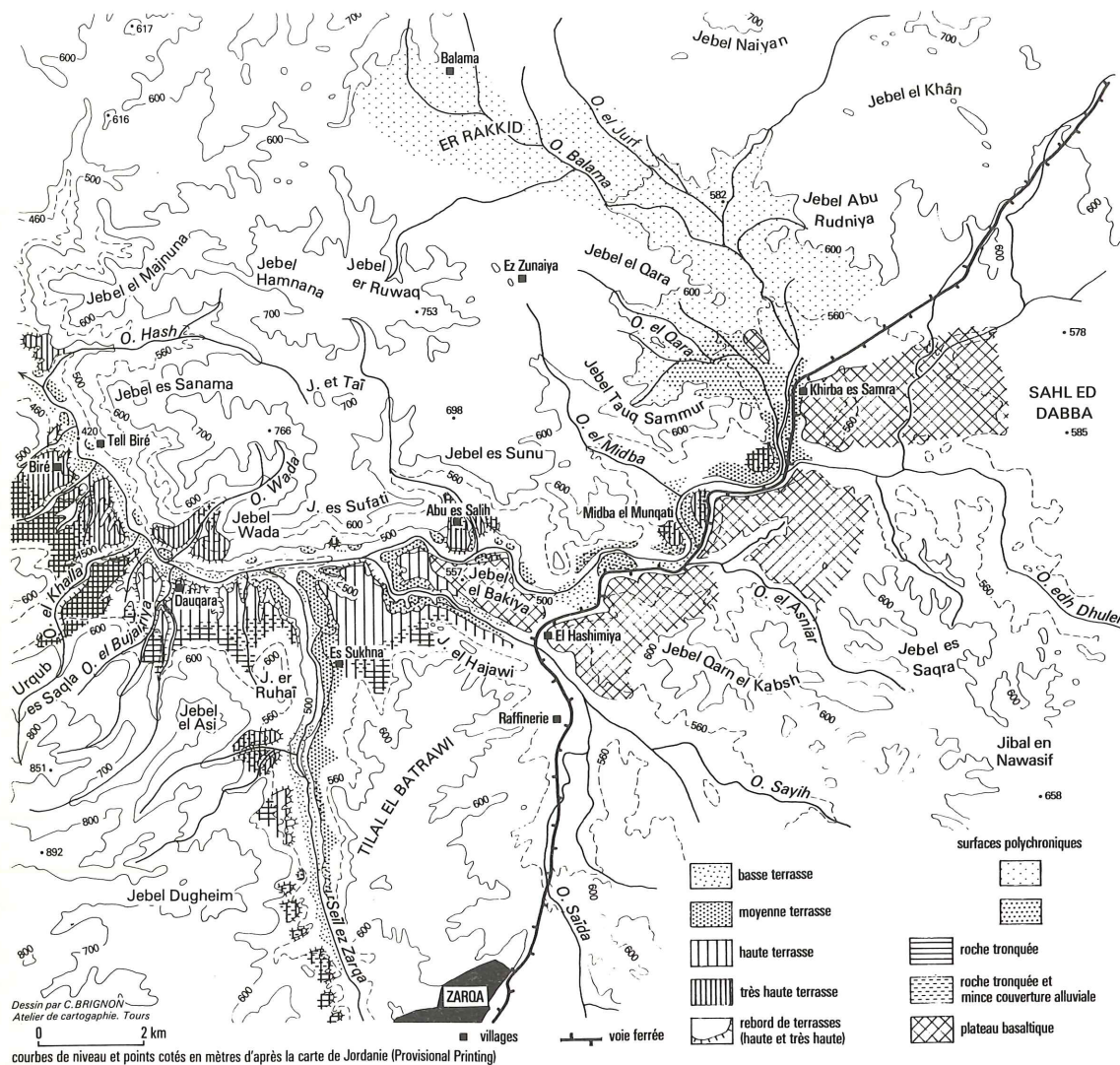
⁸ If the QmIII (Zaqrounian) shoreline is equivalent to the Cromerian complex.

⁹ Hours in Cauvin and Sanlaville (eds.) 1981, 165–183.

¹⁰ Copeland and Hours in Cauvin and Sanlaville (eds.) 1981, 225–238.

¹¹ Copeland in Cauvin and Sanlaville (eds.) 1981, 239–263.

1. The Quaternary formations in the Zarqa–Samra area.



could be applied in Jordan and for this purpose we chose two sectors in the northeast, the first between Khirbet Samra, El Biré and Zarqa, around the rivers Dhuleil and Zarqa, the second in the environs of Qasr Kharana. There were two reasons for this, one being that these areas are not too far from Syria (which would make comparisons not inappropriate), the other being that these zones had not been affected, at least in the recent past, by tectonics and by the rifting in the Jordan Valley. From the geomorphological viewpoint, therefore, these areas are comparable to those with which we are familiar in Syria, and this makes it easier for us to understand them.

The Khirbet Samra/Zarqa sector (FIGS 1 and 2)

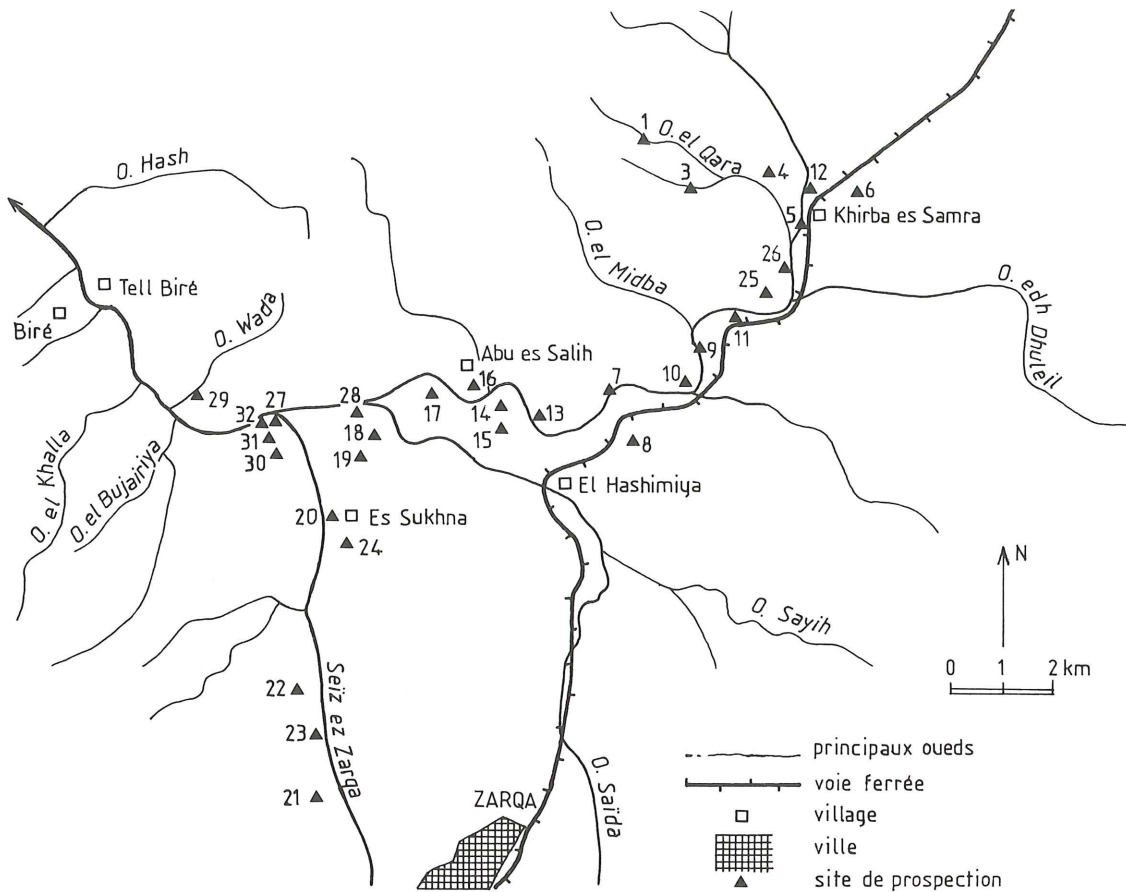
This sector consists of the area drained by the waters of the Rivers Zarqa, Dhuleil and their affluents. These streams have deposited accumulations of eroded material along their courses, and have built-up river terraces which are particu-

larly visible in the El-Biré region. The oldest formations are covered by basalt layers and do not contain artifacts. According to the dates of the basalts, they are too old and do not refer to the Pleistocene¹². For the Quaternary, a suite of terraces and formations are present:

- 1) The highest ('Uppermost') terrace contains no artifacts.
- 2) The next highest ('high') terrace (+45 m.) is the 'Dauqara Formation'. Although the interior of the deposit produced only a few undiagnostic flint flakes we did find a Late Acheulean site on the surface, in which the bifaces resembled those of the Acheulean sites on the Khirbet Samra platform. The Dauqara Formation could be correlated with the QfIII, the Latamne Formation of the Syrian Scheme.

¹² Our colleague J.-J. Macaire will soon make available some dates for the basalts based on the K/Ar. method; the basalts are of different ages from about seven to about two million years old.

2. Localization of the sites from Lower Paleolithic to Epi-Paleolithic in the Bire-Zarqa-Samra area.



- 3) The succeeding Formation (QfII = El Biré Formation) contains assemblages, not very numerous, but characteristic enough. Rolled and brown patinated flakes are associated with handaxes. This is comparable to the Jraibiyate Formation in the Orontes and the Ain Abou-Jema'a Formation on the Euphrates (FIG. 3).
- 4) The next unit is the Khirbet Samra Formation = QfI. It contains flint assemblages with grey-blue patina consisting of cores, Levallois flakes and a few bifaces (FIG. 4), just as in the Abou Chahri Formation on the Euphrates and so attributable to the Last Glacial/Pluvial. It should also correspond to the Ech-Chir Formation on the Nahr el-Kebir. As in both the two latter Syrian regions, the Khirbet Samra Formation could be divided locally into two Members, for example in the Khirbet Samra area.
- 5) The Low Terrace (+2 m. - +4 m. = Sukhne Formation, QfO) consists mainly of fine materials and can be attributed to the Holocene. A classical Kebaran industry, late, but apparently non-geometric, was found in it at the confluence of the Zarqa and the Dhuleil (FIG. 5). A Pre-Pottery Neolithic settlement seems to occupy the surface. Other assemblages occur in the same position. This formation is therefore probably polychronic and

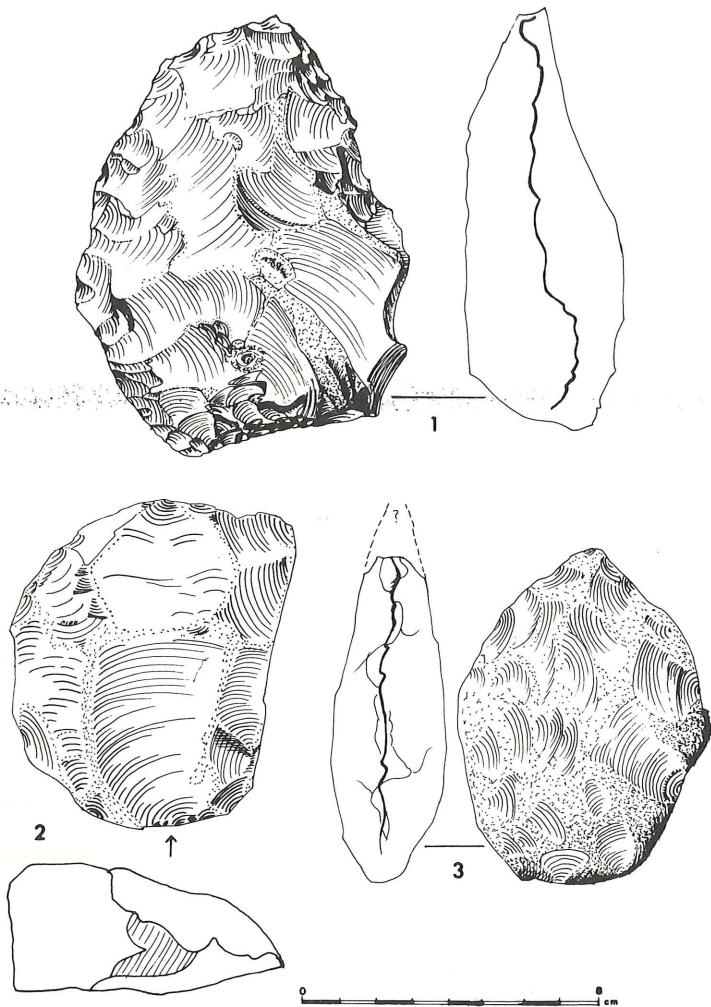
dates, in several episodes, to the last phase of the Quarternary.

In addition to the assemblages in recognizable stratigraphic positions, there are some important surface concentrations of flint artifacts. On the top of the Dauqara Formation, downstream from the confluence of the Zarqa and the Dhuleil, we have found a huge area covered by a late evolved Acheulean, including well finished handaxes and big Levallois cores. This is very likely to be dated later than the Acheulean of the El-Biré Formation (QfII), but earlier than the Middle Palaeolithic of the Khirbet Samra (QfI) Formation (FIG. 6).

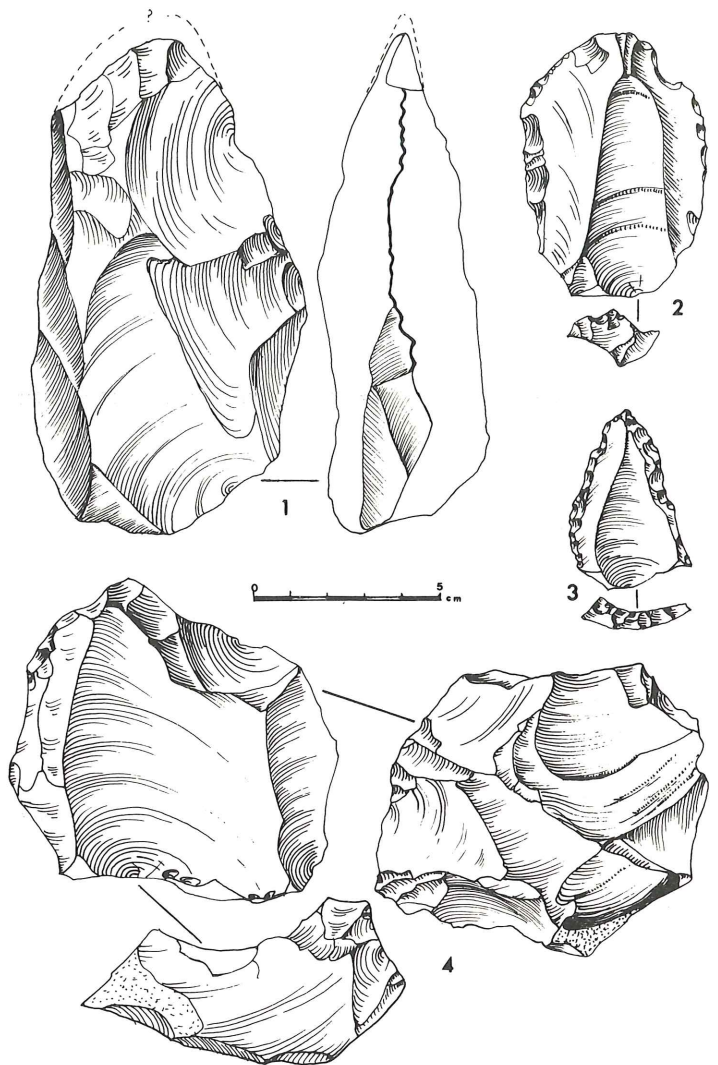
The Qasr Kharana sector (FIGS 7 and 8)

A kind of corridor, 20 km. wide and 70 km. long conducts the watercourses in a generally easterly direction towards their end in the Azraq basin; among them are the Wadi Janab/Mushash and the Wadi Mudeisisat/Kharana. The hills which surround them are no higher than 900 m. The mean slope of the corridor is only 0.5 per cent, which influences the speed of the water flow, tends to produce braiding and diverging courses, and makes it difficult to have embedded terraces. In spite of the erosion, the bedrock, consisting of

3. Artifacts from the El-Biré Formation (QfII) 1, Rolled backed handaxe. 2, Rolled Levallois core. 3, Very rolled ovate handaxe.



4. Artifacts from the Khirbet Samra Formation (QfI). 1, Handaxe. 2, Levallois flake. 3, Levallois point. 4, Levallois core.



Palaeocene (Eocene) Marls, has survived in some places: for example the platform on which the castle at Kharana was built. This is approximately 150 m. below the crest of the neighbouring hills.

In this sector, a very high ('Uppermost') terrace does not exist. There is a High Terrace which is cut into the bedrock; in places, a poorly-consolidated conglomerate occurs at the edge. This terrace is only 12 m. above the bottom of the present day wadi bed. The Middle Terrace contains, as in the environs of Khirbet Samra, assemblages with Levallois debitage and thus seems datable to the first half of the Last Glacial/Pluvial. However, it certainly includes re-worked earlier formations and surfaces, since it also contained Late Acheulean artifacts, for example in the Wadi Mushash quarries (FIG. 9).

The Low Terrace is complex and, just below Qasr Kharana, consists of a lower, stony layer with Upper Palaeolithic-like flints, and an upper, clayey layer. The latter contains inclusions of calcareous matter and some artifacts, also Upper Palaeolithic. Finally, a loess-like cover, with inclusions of

calcareous concretions, contains some Epi-Palaeolithic artifacts. The Surface is occupied by Epi-Palaeolithic tells; the industries of these, from an archaeological point of view, seem to refer to a kind of late geometric Kebaran. Theoretically, this dates to 12,000–10,000 BC but the C14 dating is here much later, around 8,000 BC¹³. In any case the Low Terrace can only be dated to the second half of the Last Glacial/Pluvial.

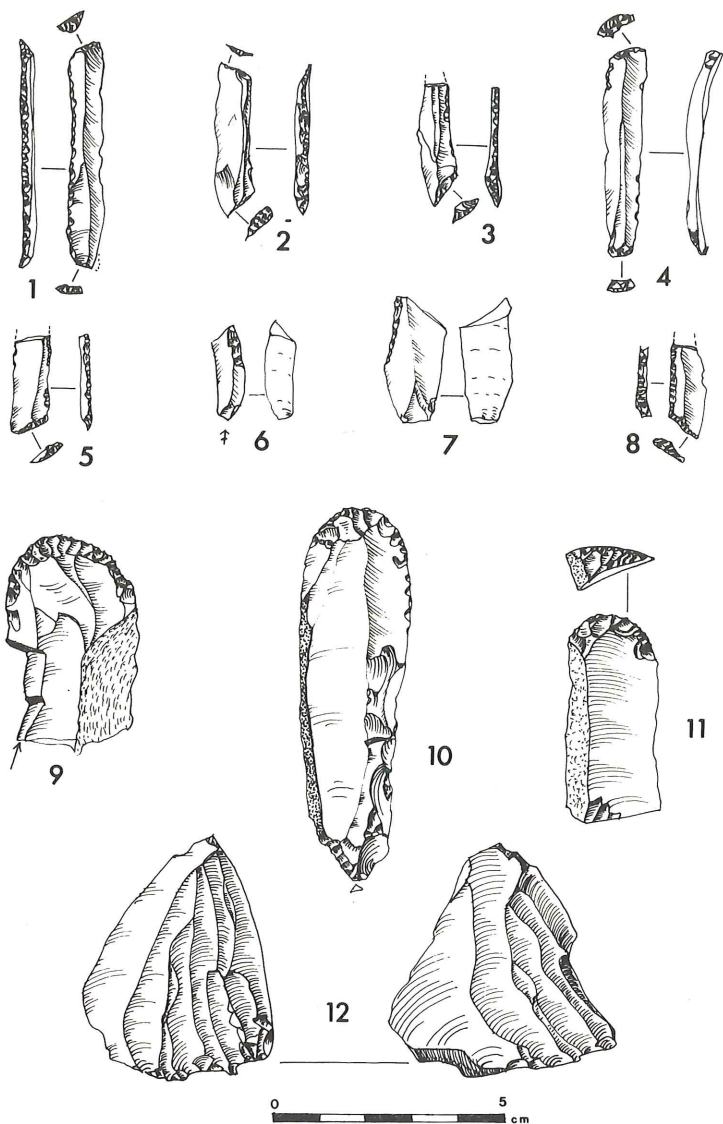
Conclusions

Some provisional conclusions can be drawn from this, our first contact with Northern Jordan and its Palaeolithic. We have available 4,500 artifacts collected from 70 locales.

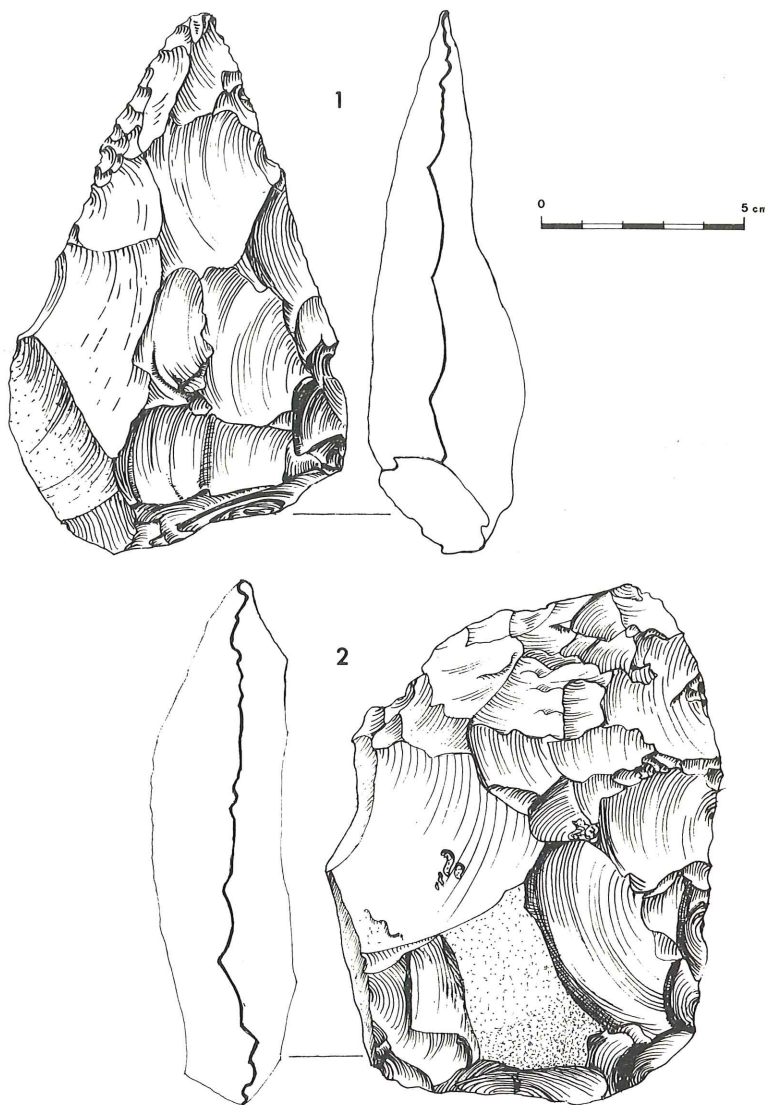
- 1) Although the history of the Zarqa valley can be retraced to the Late Miocene, thanks to the basalts, we found nothing

¹³ Garrard, Stanley Price and Copeland, 1975–77; Garrard *et al.*, this volume.

5. Artifacts from the Sukhne Formation (Qf⁶). 1 and 2; Double truncated and backed bladelet ('proto-rectangle'). 3, 5 and 8; Backed and truncated bladelets. 4; Double truncated bladelet. 6 and 7; Microburins. 9; Burin-end-scraper; 10, 11; End-scraper. 12; Bladelet core.



6. Artifacts from the surface of site 30. 1, Lanceolate handaxe. 2, Bifacial cleaver.



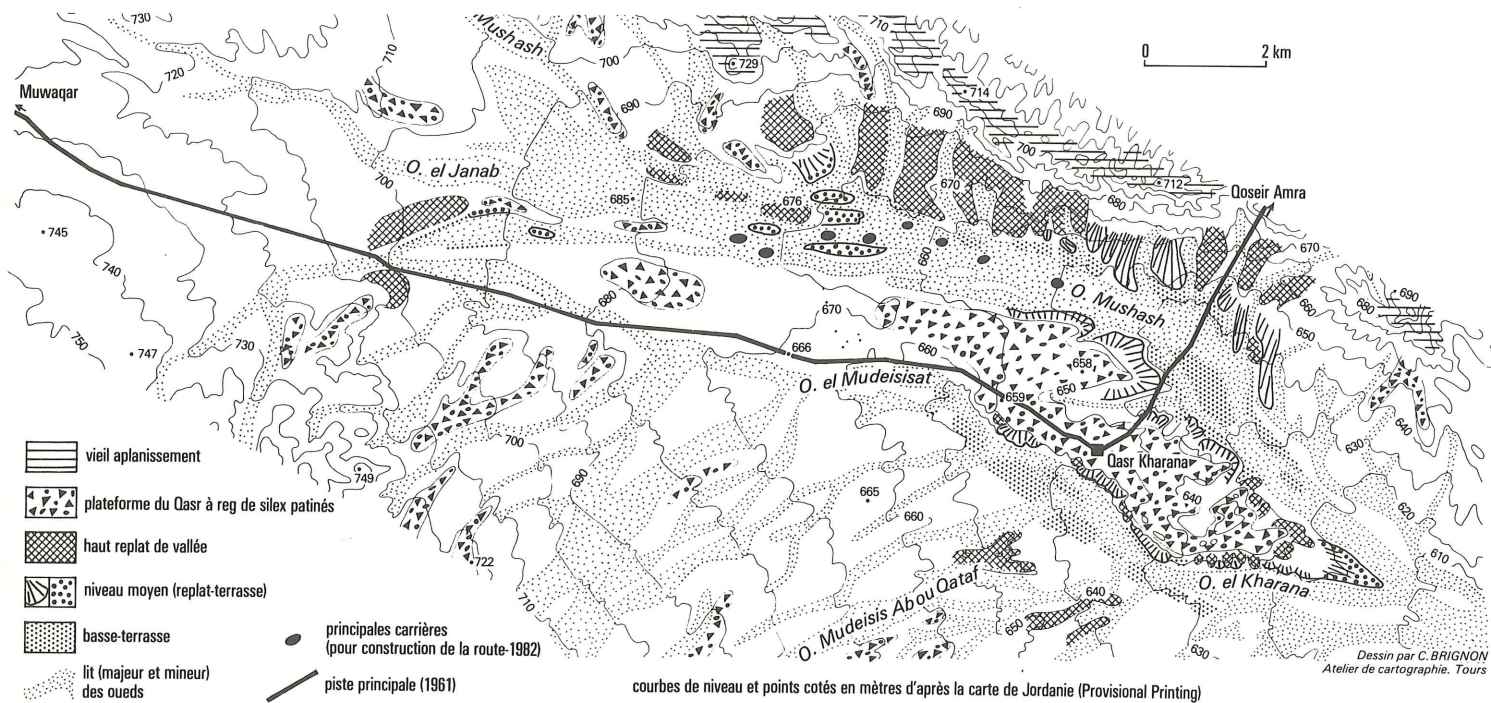
which could be attributed clearly to the Early Pleistocene, either from the geomorphological or the archaeological viewpoint. This hiatus is embarrassing, because we know that something of that kind exists in the Jordan valley.

- 2) There are traces of geomorphological activity equivalent to the QfIII of the Syrian rivers (Middle Pleistocene): the Dauqara Formation in the Khirbet Samra sector, and some seemingly ancient conglomerates in the Qasr Kharana sector. These deposits contain a few atypical flakes and no handaxes, but the artifacts are too scarce, and this is not significant.
- 3) The first consistent evidence of archaeological material comes with the QfII Formations (end of the Middle

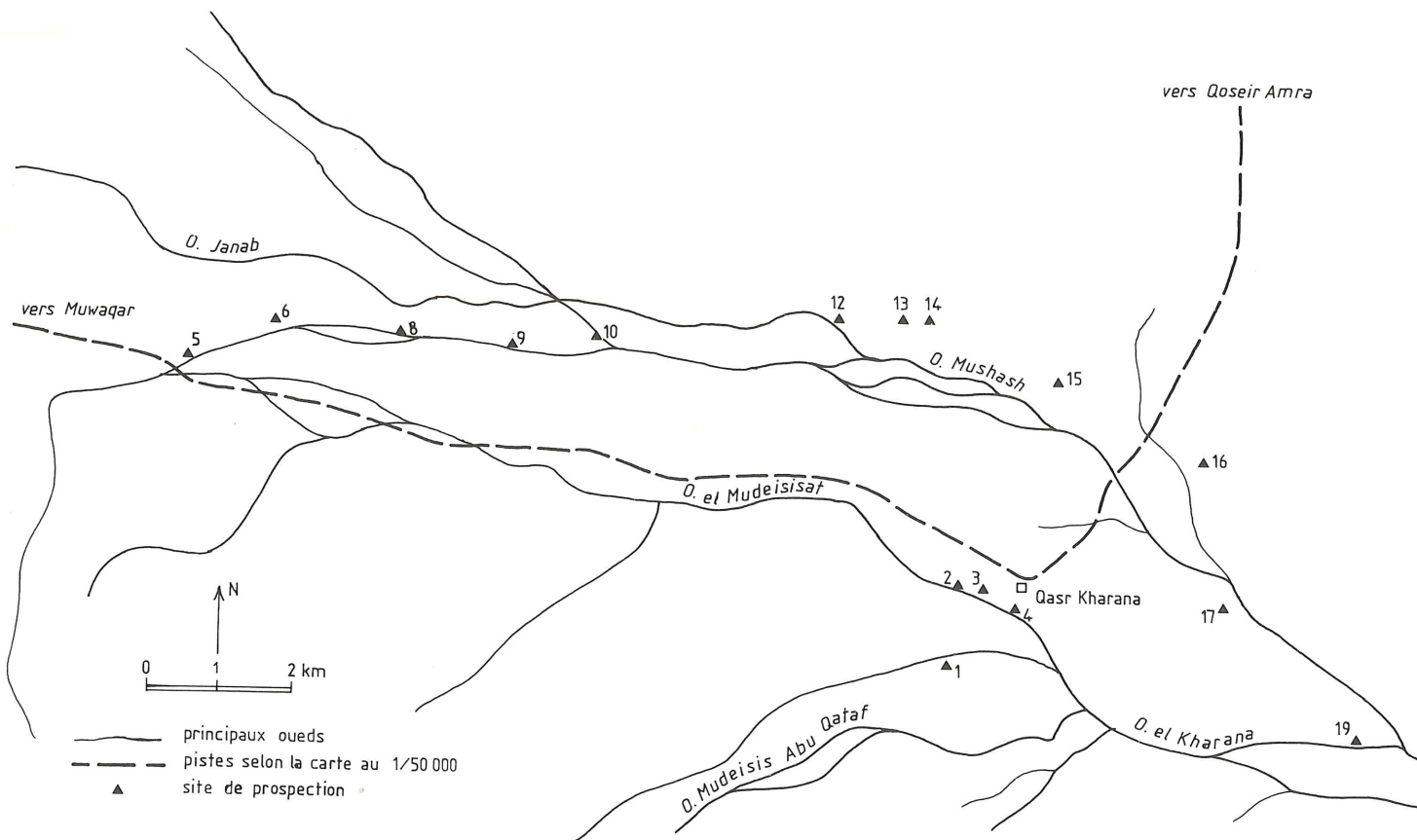
Pleistocene): the El Biré Formation in the Khirbet Samra sector and the Wadi Mushash quarries. We are already dealing here with the Late Acheulean. It is characterized by large, rolled, ovate and amygdaloid handaxes and Levallois debitage; the Levallois pieces are well-made and large. It would seem that the Acheulean surface sites with unrolled artifacts in the Khirbet Samra area are younger.

- 4) The first half of the Last Glacial/Pluvial produced terraces which contained Middle Palaeolithic as well as a few handaxes of small size. The same thing occurs on the Euphrates at Abou Chahri and is difficult to interpret. The assemblages could either represent a Middle Palaeolithic of Acheulean Tradition or a mixture of Middle Paleolithic and earlier Surface assemblages, with handaxes, from the preceding Glacial/Pluvial. Here, too, further clarification is needed.

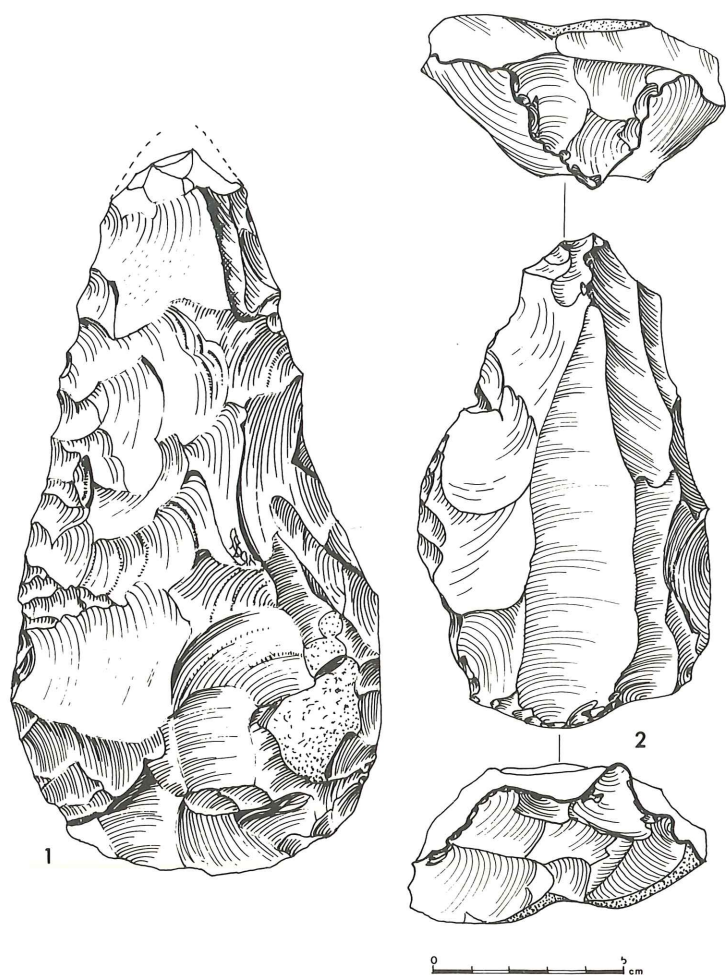
7. The Quaternary formations in the area of Qasr Kharana.



8. Localization of some Paleolithic sites in the Kharana area.



9. Artifacts from the Wadi Mushash. 1, Lanceolate Handaxe. 2, Elongated Levallois point core.



Concerning the above four conclusions, up to now (the end of the Late Pleistocene) what we have seen in inland Northern Jordan seems very similar to what we found in Central Syria. The banks of the Euphrates from Menbij to Deir ez-Zor show the same succession of deposits and industries. In contrast, the Northern Jordan areas we studied differ from the Libano-Syrian rift valley areas and the coast; in these regions there are important earlier formations which contain abundant flint industries (Sitt Markho and Berzine on the Nahr el Kebir, Latamne on the Orontes, and Jub Jannine on the Litani). It seems, therefore, that the main Acheulean occupation of north-eastern Jordan occurred, as in the Syrian steppe, only at the end of the Middle Pleistocene.

With the second half of the Last Glacial/Pluvial the succession of events in Northern Jordan takes its own course.

5) The terraces corresponding to the end of the Last Glacial/Pluvial (30,000–10,000 BC) are relatively important: confluence of the Dhuleil and Zarqa, and along the Wadi Mudeisis-Abou-Qataf (this is in contrast to Syria, where such evidence is exceptional). Moreover, the de-

posits contain artifacts. Together with the occurrence of abundant Epi-Palaeolithic in Azraq Oasis areas¹⁴, this indicates that human occupation was relatively dense in the region at that time, as it was further south (W. Hasa, ed-Dhra', etc.)¹⁵. It is worth emphasizing that during five years of surveying in Northern Syria we found no evidence of a comparable situation. However, something similar does exist in Central and Southern inland Syria: at el-Kowm, Palmyra, Yabroud, Jayroud, Qornet Rharra, Taybé. This should probably be interpreted in the light of the differences recorded in the vegetation between the Northern, Central and Southern Levant at that time, but the evidence is not yet completely understood. It could also be related to the change of climatic conditions at the end of the Pleistocene.

6) Finally, both at Khirbet Samra and Qasr Kharana there is very little evidence of any formation posterior to the Epi-Palaeolithic. Again this differs from what we know on the Levantine coast and in the larger Syrian Valleys, where several Holocene terraces are attested.

Perhaps Central and Eastern Jordan began to suffer from an arid climate at that time, similar to the present one, and did not enjoy the fluctuations which benefited the northern and western areas of the Near East.

This paper was prepared jointly by all the team-members, to include the work done in 1983. A definitive report is in preparation.

Bibliography

- Bennett, C. 1980. Soundings at Dhra', Jordan. *Levant* XIII, 30–39.
- Besançon, J. 1979. Préhistoire et géomorphologie: quelques réflexions d'ordre méthodologique. In Sanlaville, P. (ed.) *Quaternaire et préhistoire du Nahr el Kebir Septentrional*, 121–135. CNRS, Paris.
- 1981. Stratigraphie et chronologie du Quaternaire continental du Proche Orient. In Cauvin, J. and Sanlaville, P. (eds.) *Préhistoire du Levant*. CNRS, Paris, 146–163.
- Besançon, J. Copeland, L. Hours, F. and Sanlaville, P. 1978a. Morphologie et préhistoire de la vallée de l'Oronte entre Rastan et le Ghab (Syrie). *C. R. Académie des Sciences*, Paris, 287, Serie D, 857–860.
- 1978b. The Palaeolithic Sequence in Quaternary Formations of the Orontes River Valley, Northern Syria. *Institute of Archaeology Bulletin* 15, 149–170.
- Bintliff, J. and Van Zeist, W. (eds.) 1982. *Palaeoclimates, Palaeoenvironments and Human Communities in the Eastern Mediterranean Region in Later Prehistory*. British Archaeological Reports, Int. Series 133.
- Cauvin, J. and Sanlaville, P. (eds.) 1981. *Préhistoire du Levant*. CNRS, Paris.
- Copeland, L. 1981. Chronology and Distribution of the Middle Palaeolithic, as known in 1980 in the Lebanon and Syria. In Cauvin, J. and Sanlaville, P. (eds.), *Préhistoire du Levant*. CNRS Paris, 239–264.
- Copeland, L. and Hours, F. 1981. La fin de l'Acheuléen et l'avène-

¹⁴Garrard, Stanley Price and Copeland 1975–1977; Garrard *et al.*, this volume.

¹⁵MacDonald *et al.*, 1982; Bennett, 1980.

- ment du Paléolithique Moyen en Syrie. In Cauvin, J. and Sanlaville, P. (eds.) *Préhistoire du Levant*. CNRS Paris, 225–238.
- Frey, W. and Uerpmann, H. P. (eds.) 1981. *Beiträge zur Umweltgeschichte des Vorderen Orients*. Beihefte zum Tübingen Atlas des Vorderen Orients, A. 8.
- Garrard, A. Harvey, P. Hivernel, F. and Byrd, B. The Environmental History of the Azraq Basin. *Proceedings of the Second Conference on the History and Archaeology of Jordan*.
- Garrard, A. Stanley Price, N. and Copeland, L. (1975–77) 1976–77. A Survey of Prehistoric Sites in the Azraq Basin, Eastern Jordan. *Paléorient* 3, 109–126.
- Henry, D. 1982. The Prehistory of Southern Jordan and Relationships with the Levant. *Journal of Field Archaeology*, 9, 417–444.
- Hours, F. 1981. Le paléolithique inférieur de la Syrie et du Liban. Le point de la question en 1980. In Cauvin, J. and Sanlaville, P. (eds.) *Préhistoire du Levant*, CNRS, Paris, 165–184.
- MacDonald, B. Rollefson, G. and Roller, D. 1982. The Wadi el-Hasa Survey, 1981. *Annual of the Department of Antiquities, Amman*, vol. 26, 117–131, 449–455.
- Sanlaville, P. 1977. *Étude géomorphologique de la région littorale du Liban*. Publication of the Université Libanaise, Beirut. 3 vols.
- 1979. Etude géomorphologique de la basse vallée du nahr el Kébir. In Sanlaville, P. (ed.) *Quaternaire et Préhistoire du nahr el Kébir septentrional*, 7–28.
- (ed.) 1979. *Quaternaire et Préhistoire du nahr el Kébir septentrional*. Editions du CNRS., Lyon.
- 1981. Stratigraphie et chronologie du Quaternaire marin du Levant. In Cauvin, J. and Sanlaville, P. (eds.) *Préhistoire du Levant*, CNRS, Paris, 155–161.