The Nile Delta as a centre of cultural interactions between Upper Egypt and the Southern Levant in the 4th millennium BC
Studies in African Archaeology 13

Lithic systems of the 4th millennium BC: A brief comparison between the industries of Egypt and the Southern Levant

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Introduction

The 4th millennium BC in the Near East is a period of momentous social change. In both Mesopotamia and Egypt state societies based on new political structures developed and expanded concomitant with a large set of associated social, economic and cultural features. The complexity of these new structures is well reflected in the full range of the archaeological record; however, this record has been exploited unevenly and many archaeological data sets have not been fully integrated into the narratives and explanations of the rise of social complexity.

Comparison of the lithic industries of the 4th millennium BC in Egypt and the southern Levant reveals marked contrasts across a range of attributes and features including typology, technology, utilitarian function, degrees of specialization, patterns of raw material exploitation, role in ritual, and structure of chronological change (*cf.* Rosen 1997a for the southern Levant). Analysis of these contrasts suggests that minimally three distinct but interacting regional industries may be defined, those deriving from the Nile Valley, the Mediterranean Levant, and the desert zones of the Negev and Sinai. Additional industrial distinctions, such as between Upper and Lower Egypt (*e.g.* Holmes 1989), or between the Nile and oasis basins such as the Fayum (*e.g.* Holdaway *et al.* 2010), may also be possible, but are beyond the scope of this paper.

Besides the obvious conclusion that the lithics, along with other archaeological remains, reflect different culture areas, at one level definable as ethnicities, these contrasts indicate basic differences in the structure of these different societies. They offer a means for better understanding the nature of the Egyptian presence in Canaan, and indeed, the Canaanite material culture in Egypt; they also offer insights into the structure of economies and social hierarchies.

Problems of methods

Lithic analysis can be conducted at a range of scales (*cf.* Andrefsky 1998; Odell 2004), from the microscopic analysis of wear and damage patterns (*e.g.* Keeley 1980; Odell 2004) through large mass debitage analysis (*e.g.* Sullivan & Rozen 1985). Each of these offers insights into aspects of lithic archaeology, and each demands a specific set of protocols for retrieval and analysis. Needless to say, for rigorous comparative study, it is preferable that the protocols for the comparative sets be similar; unfortunately, in the case of lithic assemblages this is rarely the case. Regional archaeological traditions have developed along different trajectories, and emphases in terms of field collection, documentation, and analysis vary from area to area, from site to site, and most certainly from archaeological generation to archaeological generation.

Thus, the first task of synthesis is to make some accounting of the potential biases deriving from differences in archaeological practice. From this perspective, in comparing Egyptian and Levantine lithic assemblages, two pitfalls are evident:

1. contrasts in collection methods and
2. major differences in archaeological contexts.

The problem of collection methods and selected assemblages (Rosen 1997a: 34-38) is primarily one of the history of research. Earlier generations of archaeologists did not recognize the significance of debitage and waste flint, and consequently the entire class of *ad hoc* tools also went unrecognized. This picture has changed in the past 25 years, primarily the result of the influence of the methods of prehistoric archaeology on that of later periods. In turn, this has resulted in a relative abundance of reasonably collected lithic assemblages in the Mediterranean Levant and the desert zones (Rosen 1997a). In Egypt, the number of comparable collections has been more limited, not necessarily due to a lesser rigor in collection, but simply due to a lesser intensity of exploration (at least partially attributable to the difficulties of finding and excavating habitation sites in the Nile Delta area; lithics have certainly been a focus in the desert depressions). Thus, whereas it is possible to obtain a picture of the Levantine assemblages without resorting to assemblages collected prior to the 1970s, in Egypt, the selected and biased assemblages collected in the first half of the 20th century (especially Petrie 1902, 1904; Petrie *et al.* 1913) must still play a major role in our understanding Egyptian lithic assemblages, of course tempered by the few well collected assemblages of more recent times (*e.g.* Rizkana & Seeher 1985; Schmidt 1992ab; Holmes 1989; Kabaciński 2012; Thomalsky 2012).

The problem of context complements that of collection. If in the Levant, archaeological investigation has focused very much on various kinds of habitation sites (tells, village sites, campsites in the desert) as well as tombs (which in fact rarely contained lithics), in Egypt, especially in the earlier history of research, exploration focused much more on burial contexts and large ritual sites. Thus, the bulk of Egyptian lithics derive from contexts with few parallels in the Levantine record. The combination of selective collection with the focus on special contexts renders comparison of assemblages complex. Nevertheless, comparisons can be drawn, with interesting and important results.

The Mediterranean Levantine record

I have synthesized the general framework of Early Bronze Age lithic industries of the Levantine Mediterranean zone several times (Rosen 1989; 1997a; 2011ab). It is beyond the scope of this paper to describe these industries in depth, but it is worth reiterating the salient characteristics and trends.

Lithic industries in the 4th and 3rd millennia BC (Fig. 1) in the Mediterranean Levant are not monolithic entities or traditions. They derive from distinct processes, reflecting different functions, technologies, raw material sources, degrees of production specialization, and segments of society (Rosen 1989; 1997a). Briefly stated, the following sub-industries may be isolated:

1. Canaanean blade technology (Fig. 1: 5-6), producing special long prismatic blades, reflects specialized production of bulk materials and local distribution systems (Rosen 1983a; Otte *et al.* 1990; Shimelmitz *et al.* 2000; Shimelmitz 2009). This technology required special skills and knowledge, and utilized specific, if not especially rare raw materials. It is pan-Near Eastern in distribution. Functionally, the blades were almost exclusively used for sickle segments (claims for threshing teeth notwithstanding, *e.g.* Anderson *et al.* 2004).
2. Tabular scrapers (Fig. 1: 4, 7) were produced on large primary flakes whose cortex was deliberately retained, contrasting greatly in all particulars with Canaanean technology (Rosen 1983b; 1997a: 46-49). Quarry sites for these implements have been found exclusively in the peripheral desert zones (Fujii 1998; 1999; Rosen 1997a: 75; Quintero *et al.* 2002); the pieces were transported to the Mediterranean zone, apparently in a variant of down-the-line exchange. Functionally, Mcconaughy (1979; 1980) has suggested that tabular scrapers were in fact knives used in ritual activities. Shoh Yamada (*pers. comm.*) has noted that fracture patterns indicate intentional breakage, also in ritual contexts. The presence of incised symbols and special caches and find contexts for many of these pieces supports the hypothesis of a primarily ritual function (Rosen 1997a: 74-75). Suggestions that the pieces were used as sheep shears, based on informal experiment and analysis of wear patterns (*e.g.* Bennett *et al.* 1989; Barket & Bell 2011) ignore both the contexts of the finds and alternative explanations of the wear.
3. *Ad hoc* tools (Fig. 1: 1-3) comprise the dominant technological mode of the Levantine lithic systems of the 4th and 3rd millennia BC (Rosen 1997a: 106, 110, 111, 112, 115, 158-9). Unlike the previous two tool classes, each reflecting one form or another of specialized manufacture and exchange, *ad hoc* tools were produced on-site by the consumer and discarded quickly. The technology reflects no standardization and little investment in core preparation or rejuvenation. Raw materials are local, unless imported tools were recycled. These tools cover a wide range of domestic functions including cutting, scraping, whittling, and piercing, on a range of materials, and they therefore include a range of informal tool types (Mcconaughy 1979; 1980).

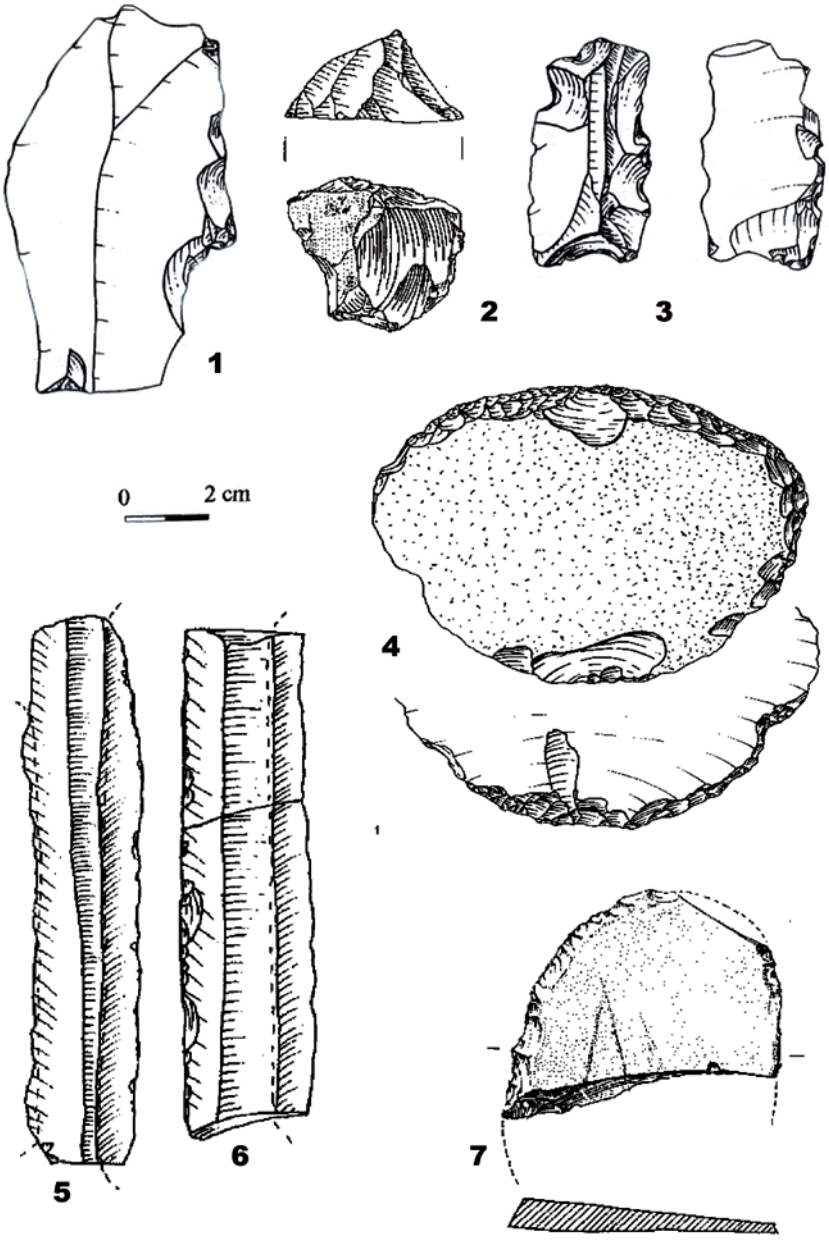

Figure 1. The Mediterranean Lithic Complex: 1-3 *ad hoc* tools; 4,7 tabular scrapers; 5-6 Canaanean blades.

The Desert Zone Industry

The lithic industry of the desert zones (Fig. 2) in this general period (Rosen 2011ab; and especially Hermon *et al.* 2011 for the early 3rd millennium BC in the Negev; Henry 1995 and Henry & Turnbull 1985 for Jordan; Bar-Yosef *et al.* 1986 for South Sinai) contrasts with that of the Mediterranean zone in the absence of specialized production of chipped stone tools, in the scarcity of sickle blades (except in special microenvironments), in the continued use of arrowheads, in the presence of microlithic drills for bead manufacture, and in typological contrasts in shared tools. Technologically the industry is dominated by small flakes. Small blades and bladelets were manufactured as variants of the basic flake industry, as indicated in the absence of dedicated blade and bladelet cores, and the presence of cores showing a mixture of flake, blade and bladelet scar patterns in addition to the flake cores. That is, unlike the Mediterranean zone and Egyptian assemblages, no sub-industries can be defined in the desert zone. Types all derive from essentially the same system.

In somewhat more detail, with the exception of tabular scrapers, produced in the desert but at quarry sites (*e.g.* Rosen 1997a: 75; Fujii 1998; 1999; Quintero *et al.* 2002), lithic assemblages in the desert show a full range of debitage, indicating production of all types on site. Raw materials for lithic manufacture are local, again with the exception of the tabular scrapers.

Functionally, the consistent presence of transverse arrowheads (Fig. 2: 3-5) (typologically following a chronological sequence from triangular to trapezoid to lunate; Rosen 2011b) in sites with reasonable collection procedures comprises a distinct contrast with the settled zone, where chipped stone arrowheads disappeared from the lithic repertoire at the end of the 6th millennium BC. In fact, the use of transverse arrowheads is known from contemporary times in Egypt (especially Clark *et al.* 1974; Clark 1975-77) and constitutes one of the few clear parallels with Egyptian materials.

Microlithic drills (Fig. 2: 7-8) for bead production are found in many Timnian sites, manufactured on small flakes or bladelets (*e.g.* Rosen 1997b), technologically similar to the transverse arrowheads. These seem to disappear from the Mediterranean repertoire by the beginning of the Early Bronze Age, ca. 3700 BC, thus constituting another functional difference between the desert zone and the north.

Sickle segments are scarce in desert sites, reflecting the general absence of systematic agriculture in the region, obviously the consequence of the environmental constraints on agriculture in the arid zone. However, in those microenvironments where agriculture could be practiced, such as the Aqaba area and the Uvda Valley (Rosen 1997a: 128, 141; Herling 2002ab), the sickle segments were made on simple backed blades and arched backed blades (Fig. 2: 9-11), the blades themselves little standardized. These thus contrast technologically and typologically with both the Egyptian and Canaanean types.

Tabular scrapers (Fig. 2: 12-13) are found in all Timnian sites, and have been recovered from caches in tumuli. As indicated above, quarry sites for these pieces are located exclusively

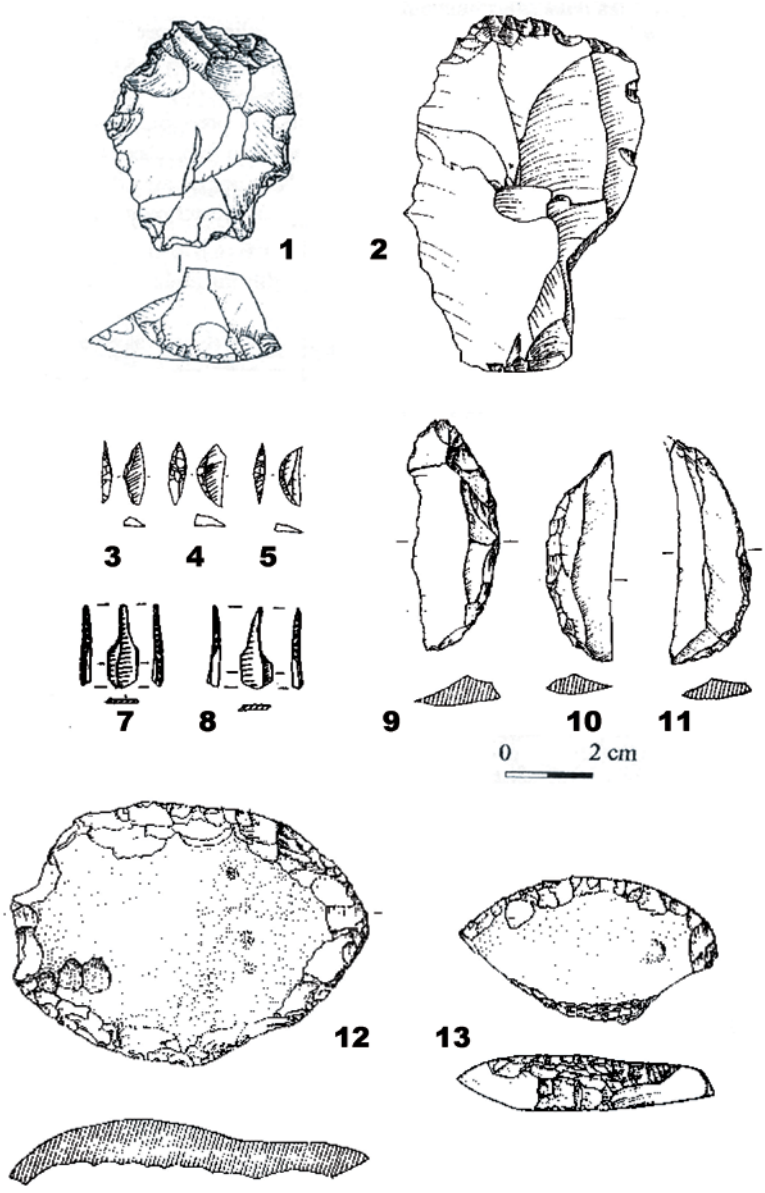

Figure 2. The Desert Lithic Complex: 1-2 *ad hoc* flake tools; 3-5 lunates (tranverse arrowheads); 9-11 blade tools; 12-13 tabular scrapers.

in the desert zone. Functionally, although cult use is clearly indicated in the caches and other ritual settings, their presence in domestic sites with little evidence for cultic context suggests domestic functions, perhaps re-use within the general *ad hoc* tool set.

In addition to these more standardized types, *ad hoc* tools (Fig. 2: 1-2) including retouched flakes and blades, notched and denticulated pieces, various kinds of pointed pieces which probably served as awls or gravers, and various kinds of scrapers in fact numerically dominate most desert lithic assemblages. The basic technology underlying these pieces is shared with the more formal tools.

The Egyptian assemblages

As per the Mediterranean zone assemblages, the Egyptian assemblages (Fig. 3) may be divided into techno-typological components produced in distinct *chaînes opératoires*. A detailed study of Egyptian Predynastic and early Dynastic lithic industries is beyond the scope of this work and this review will focus on general structures which can be compared and contrasted to those of the southern Levant.

Egyptian lithic industries in the Predynastic and Early Dynastic periods comprise several discrete technologies, probably organized in different lithic production systems. These include:

1. The large family of bifacial knives (Fig. 3:7). There was a wide range of elaborate and beautiful bifacial knives, including ripple knives, produced in this period (*e.g.* Keltenborn 1984; Stocks 2003; Kabaciński 2012; Petrie 1902: pls. XIV-XIX; 1904: pl. VII:3, 5-9; Petrie *et al.* 1913: pl. VII: 2,5,6,10; Rizkana & Seeher 1985: fig. 8:1-2; Schmidt 1992ab). The set of these types clearly evolves typologically and technologically over time. Crucial to our understanding of the type is the great skill and effort required to produce these tools, even the less elaborate ones, and the special raw materials required (Keltenborn 1984; Kabaciński 2012). It is likely that many of these, especially the larger ones, were essentially ritual in function (Graves-Brown 2010). This is supported by the high number recovered in mortuary contexts. Thus, these tools represent a specialized production, requiring significant apprenticeship, devoted primarily to the production of elite ritual items.
2. Arrowheads. Two types of arrowheads can be defined, the transverse types and the bifacially worked fishtails and concave base types (*e.g.* Clark *et al.* 1974; Clark 1974; Seeher 1990). Although these appear to converge functionally, they clearly represent distinct systems, one requiring skills akin to those for producing bifacial knives and the second working microliths into appropriate small pieces for hafting at the end of arrow shafts.
3. Eccentrics. Egyptian lithic assemblages also include delicate and sophisticated chipped stone figures of various kinds (*e.g.* Hoffman 1979: 112). The skills required for the manufacture of these figures are akin to those required for the finely made bifacial knives. Functionally, these were clearly primarily symbolic. Notably, they are probably too fragile to have served as toys.

4. Blade tools (Fig. 3:3-4). This group includes backed and truncated or merely truncated blades (*e.g.* Schmidt 1992ab; Seeher 1990; Petrie 1902: pl. XV; 1904: pl. VII: 4, 8, 18-19, 23-24, 28; Klasens 1961: fig. 12:6). Some of these were clearly sickle inserts (to judge from the glossy edges), although they differ from the bifacially worked and denticulated sickle blades which are perhaps better classified with the other bifacially worked pieces. These blades are short and prismatic. The general absence of blade cores indicates specialized production.
5. Bladelets and bladelet tools (Fig. 3:1-2) include twisted bladelets and various nibbled bladelets (Rizkana & Seeher 1985; Baumgartel 1970: 490). Microlithic drills (Kabaciński 2012; also see Stocks 1989; for example at Hierakonpolis, Hoffman 1979: 154) can also be included in this category. These all appear to have been the products of some kind of specialized manufacturing system.
6. Scrapers and what have been called razors are standardized tools on wide blades or elongate flakes with either rounded (scraper) or square (razors) retouched ends (Fig. 3:5-6) (*e.g.* Schmidt 1992ab; Rizkana & Seeher 1985; Seeher 1990; Petrie 1902: pl. XIV; Reisner 1908: pl. 40c). The apparent standardization suggests some kind of specialized production, but this is difficult to evaluate in the absence of better contexts.
7. Imported pieces include tabular scrapers and Canaanean blades, but these are relatively rare (*e.g.* Rizkana & Seeher 1985).

Significantly missing in this repertoire is the set of *ad hoc* tools so dominant in the Levantine assemblages. While this may partially be the result of a general scarcity of flint in the Delta area, and in the Fayum *ad hoc* tools are evident (Holdaway *et al.* 2010; Phillipps 2006), it also indicates that other materials must have been used in lieu of simple flakes and flake tools. That is, an entire functional realm of the lithic repertoire, *ad hoc* domestic tasks, seems to be missing from the Egyptian lithic system, at least in some areas.

Discussion and conclusions

Given the above summaries, the typological and technological contrasts between the three regions should be evident. In previous studies comparing only the Egyptian materials from Canaan to the local industries (Rosen 1988; 2011a), I suggested that these contrasts ultimately reflected the intersection, at the end of the 4th millennium BC, of three distinct ethnic groups, each with its own lithic organization, *chaînes opératoires*, and lithic functions, and that in circumstances of geographic or chronological cusp we can identify and interpret ethnic relations based on lithic analyses. Thus, crucially, there is was actually little interplay between the Egyptian and Mediterranean zone lithic systems. Egyptians do not seem to have adopted Levantine lithic techniques or types, and vice versa. There was thus little or no interaction between the knappers of the two systems, and functionally the Egyptian colony, *sensu lato*, in the southwestern Levant (Brandl 1989; Porat 1989; Gophna 1990; Gophna & Friedmann 1993) did not rely on local lithic

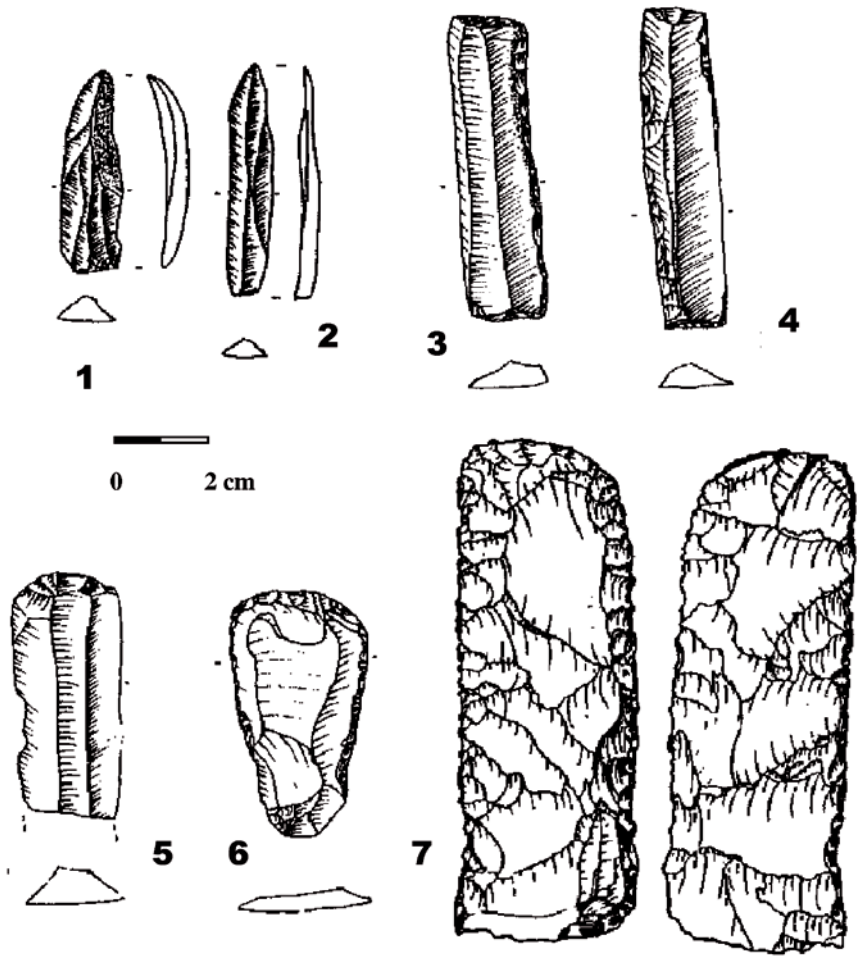

Figure 3. The Egyptian Complex (as represented by materials from Palestine): 1-2 bladelets and bladelet tools; 3-4 blade tools; 5-6 scrapers; 7; bifacial knife.

production. Similarly, lithic production in the desert zone was autonomous, showing few direct linkages with the lithic systems of other regions, the tabular scraper exchange and microlithic lunates excepted.

From a larger perspective, beyond the relationships between ethnic groups, the lithic systems reflect fundamental differences in the organization of their respective societies. It is undoubtedly trivial to note that Egyptian society was a deeply hierarchical early state at

the end of the 4th millennium BC, that Levantine Early Bronze Age societies in this period were only emerging into complexity, and that Timnian society in the desert was tribal. More importantly, the lithic systems offer detailed reflections of these different levels of political organization; they represent the actualization of the political organization on the respective economies, at least insofar as they impacted on lithic technological systems. Thus, the lithic systems here offer a case study in comparative political economy.

Two specific themes can be examined, the organization of production and the functional roles of the lithics. The organization of production incorporates such issues as specialization in production and exchange; the functional roles of lithic systems covers the specific uses of different chipped stone tools in the different societies.

Comparing production, the three lithic regions contrast in degrees of specialization and expertise involved in lithic production. In the desert regions, lithic production specialization is limited to the manufacture of tabular scrapers, and this seems to be primarily a regional specialization rather than a division of labor internal to the society. In fact, the skill set required for the production of tabular scrapers is a relatively simple one. With respect to the rest of the desert lithic system, with the likely exception of age and gender divisions of labor, for example as in the production of microlithic drills for bead production or arrowheads, there is no evidence for specialized lithic production in the desert societies. In this context, it is important here to note that the Timnian culture supplied specialized goods to the sedentary Mediterranean zone, for example copper goods, milling stones, beads, and sea shells; however, production seems to have been by and large extensive, a form of cottage production at the household or clan level, and not specialized in the craft specialization sense (Rosen 2009).

As reviewed above, in the sedentary Mediterranean zone three basic lithic systems can be defined. The Canaanean system, producing Canaanean blades for insertion into sickle hafts, is clearly a specialized system; the blades were produced by specialists and distributed to consumers, apparently in a cellular network of sub-regional production and supply zones. The production of these blades required expertise and some degree of apprenticeship, but it was undoubtedly a seasonal enterprise, coinciding with the seasonal need for sickle segments. Further, given the caches of unused blades, specialization was restricted to the production of the raw blades, and not to the finished product, the composite sickle. Significantly, sickle blade segments are a bulk item, probably produced in the thousands or more each season, and they are utilitarian in function. Excepting the choice of the specific technology (*e.g.* Sackett 1990), there is little style or symbol in these tools; furthermore, there is no evidence for elite involvement in their production or distribution.

The other two lithic systems of the sedentary Mediterranean zone, those of tabular scrapers and *ad hoc* tools, show no evidence for specialized manufacture. The first is imported into the region from the desert zones and the second is clearly a product of expedient household production.

The Egyptian systems contrast. The bifacial tools, including the bifacial knives, the arrowheads, and the eccentrics, comprise a general *chaîne opératoire* more complex and a skill set more demanding (*e.g.* Kelterborn 1984) than anything seen in Levantine industries. Apprenticeship for these knappers must have considerably exceeded those of the specialized Levantine knappers. Furthermore, unlike Canaanean blades, produced in bulk in the thousands or tens of thousands, or tabular scrapers, also produced in large numbers (Quintero *et al.* 2002), each bifacial must have been crafted individually. These are not utilitarian goods. The combination of stylistic function and the great investment in terms of apprenticeship and production time and effort for a relatively limited number of pieces strongly suggests elite sponsorship.

Other formal types in the overall Egyptian system, the bladelet and blade tools, the various scrapers (and 'razors') and perhaps the transverse arrowheads, are less complex technologically. They also seem to have been produced in greater numbers than the bifacials, and to reflect a standardization and specialization roughly equivalent to that of the Canaanean system in the Levant.

Finally, the *ad hoc* production system so numerically dominant in the Levant seems much less so in Egypt. It is difficult to ascertain the reasons for this. Certainly, early excavations discarded lithic waste and *ad hoc* tools, similar to the rest of the Near East (Rosen 1997a). However, recent excavations in Egypt certainly collect all materials, yet *ad hoc* tools seem rare. In the Delta, this may be a consequence of the relative rarity of chippable stone, perhaps accessible only to specialists. Alternatively, it is also possible that flakes and other lithic products were utilized in Egypt without the intermediary stage of edge modification (*e.g.* Holdaway *et al.* 2010), the primary attribute defining *ad hoc* tools in the Levant. If so, even if *ad hoc* tools thus exist, they reflect a different sense of production in Egypt compared to the Levant.

Lithic functions in the three regions tie directly to production systems, but are worth brief separate review and summary. All three regions share basic domestic functions, scraping, cutting, piercing, whittling, even when the lithics themselves may not be the product of household production, as in the case of Egypt. Reaping, as represented by sickle segments, is present in all three lithic systems, but trivially is rare in the desert system, restricted to special microenvironments where agriculture was possible. Arrowheads, reflecting either hunting or warfare, are present in Timnian and Egyptian assemblages, but are noticeably absent from 5th-3rd millennia BC assemblages in the Mediterranean southern Levant and seem to decline in numbers in Egypt in this period as well (*e.g.* Schmidt 1992ab). Notably, the transverse points used in 4th and early 3rd millennium Egypt are typologically similar to those in the Negev and Sinai, and may reflect cultural contact. However, the absence of any chipped stone points in the Early Bronze Age Levant points to a basic techno-functional divergence between Egypt and the Levant.

The most striking functional difference between the various regions is found in the deep investment in chipped stone tools for ritual purposes in Egypt, and its virtual absence, excepting tabular scrapers, in the Levant. This difference is seen on several levels.

Thus, although tabular scrapers have been found in burial contexts, in tumuli, in the Sinai, lithics play virtually no role in mortuary offerings in the settled zone; in contrast, they are often found in such contexts in Egypt. Similarly, whereas tabular scrapers are traded into the settled zone in the Levant, the apparent product of a rather non-intensive peripheral zone down-the-line trade, in Egypt bifacial knives must be the product of an organized and specialized industry, an entire system focused on the production of ritual goods. The key point is that this level of investment in lithics for ideological purposes must be a reflection of the hierarchical structure of the early Egyptian state (Graves-Brown 2010), and it has no parallel in the Levant, indeed in any technological system.

In conclusion, beyond the details of the different lithic systems and the implications their analyses may have for understanding the respective societies from which they derive, the comparative method offers some perspective on the scale of the features reflected in the material culture. While detailed focus on a particular system is necessary for it full comprehension, the comparative context offers a crucial complement to that depth.

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