Seeds of collapse? Reconstructing the ancient agricultural economy at Shivta in the Negev

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Lessons from history on sustainability, collapse and resilience are the ultimate goal of the Byzantine Bio-Archaeology Research Program of the Negev (BYBAN) (Tepper *et al.* 2015). Addressing the unprecedented flourishing and collapse of the Byzantine Negev agricultural settlements (fourth–seventh centuries AD), the BYBAN project offers a unique and original approach. It focuses on ancient middens and domestic contexts, which provide an exceptional focus on the materiality of daily life. Archaeobotanical research is central to this project because the copious plant remains retrieved are a reflection of the region's agricultural economy and its environmental sustainability. This approach will enable us to answer important research questions about the Byzantine–Islamic transition in the Negev: what were the major cash and subsistence crops? Which were grown locally, and which, if any, were imported? How, if at all, did the agricultural economy change during the Byzantine–Islamic transition? Were there any major changes in climatic conditions, and, if so, can they be implicated as a cause for agricultural collapse?

Previous surveys and excavations have shown that at its peak the Byzantine site of Shivta (Sobata/Esbeita) was a thriving agricultural village (Segal 1983; Figure 1). These investigations have documented three large communal winepresses, an olive press, four dovecotes and numerous runoff irrigation channels and catchment terraces (Evenari *et al.* 1982; Hirschfeld & Tepper 2006; Tepper 2007). Papyri from nearby Nitzana (Nessana/Auja el-Hafir) refer to the cultivation of wheat, barley, the legume *aracus*, grapes, figs, olives and dates (Mayerson 1962: 227, 229, 259–62); grapes, figs, olives and dates have also been recovered from one of the Shivta dovecotes (Ramsay & Tepper 2010).

Recent and ongoing excavations at Shivta have produced a rich set of plant material from Late Byzantine and Early Islamic contexts. The relatively high level of preservation allows for

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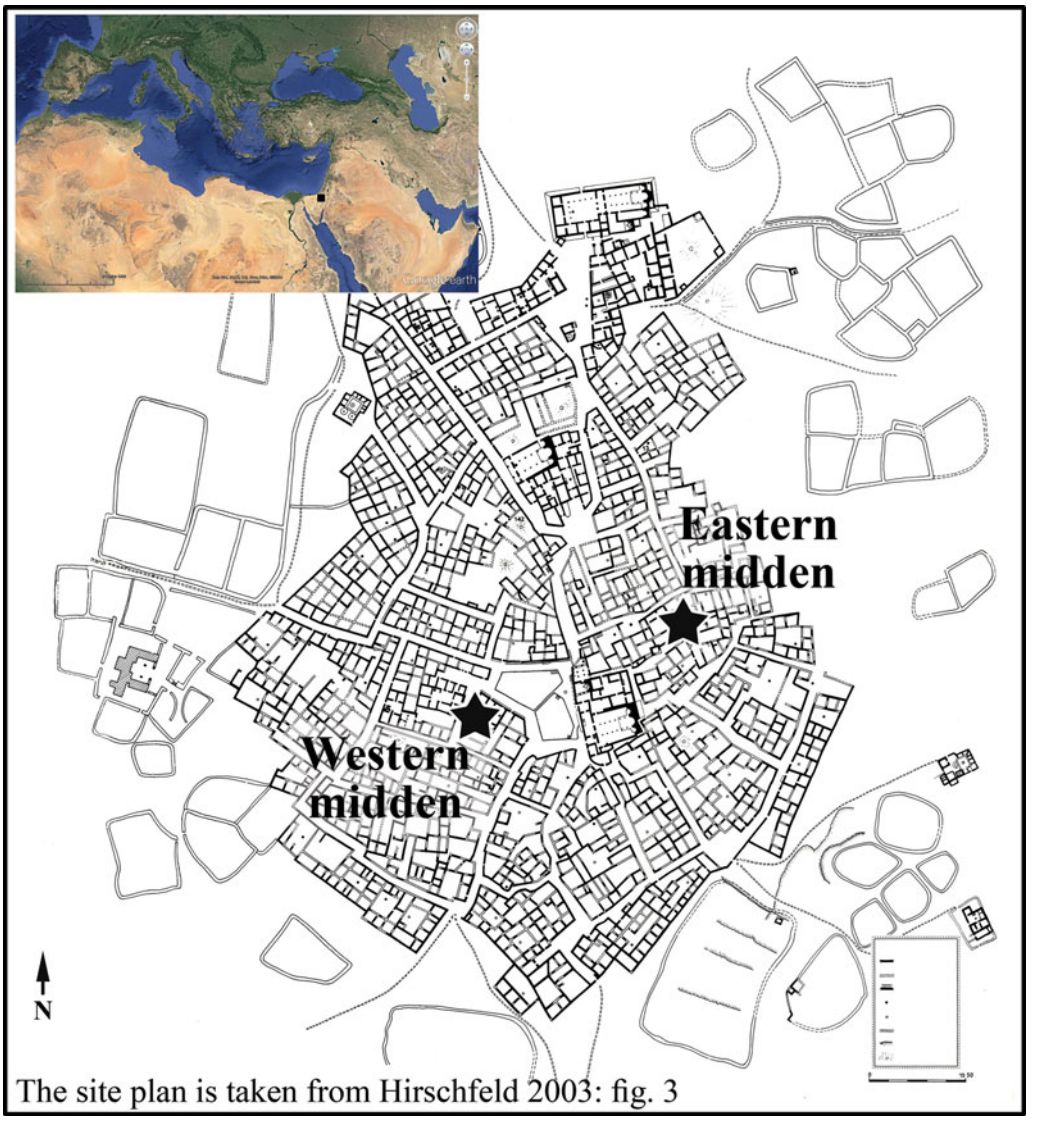

Figure 1. Shivta in geographic context. Situated in the central Negev, Shivta was part of the Byzantine Empire until the Islamic conquest. The site plan shows the location of two middens within the settlement.

identification to species, enabling a degree of economic and environmental reconstruction that has not yet been attempted for these periods and sites. Preliminary observations of the material enable us to draw some generalisations on the importance and status of different cultigens.

Cereals and pulses appear to be the staple foodstuffs at Shivta, and are common in nearly all samples (Figure 2); ear fragments and legume pods attest to the local cultivation of these crops. Grape pips are also well represented in the samples. We assume that vines

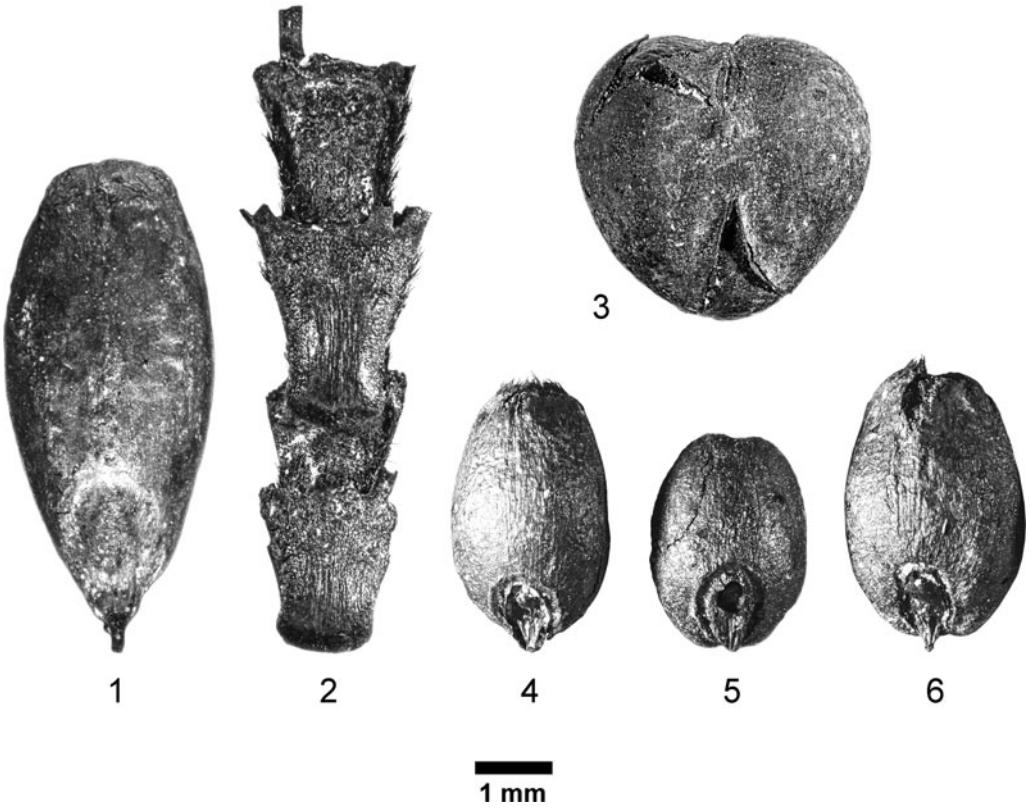

*Figure 2. Staple crops: 1) cultivated barley (*Hordeum vulgare*) grain; 2) six-row barley rachis fragment; 3) bitter vetch (*Vicia ervilia*) seed with seed coat; 4–6) bread wheat (*Triticum aestivum*) grain. All remains carbonised.*

were cultivated primarily for the production of wine for export, as local demand could have been easily met by a relatively small number of vines (Safrai 1994: 131). The grapes would have been processed at the attested winepresses within the immediate perimeter of Shivta, packaged in 'Gaza ware' amphorae and transported throughout the Mediterranean and beyond (Mayerson 1985). Other major fruit species found at Shivta include olives, dates and figs (Figure 3).

Many specific questions related to ancient desert agriculture and the Byzantine–Islamic transition will be addressed with continued archaeobotanical research. These include the extent and variety of legume cultivation, and chronological changes in the relative frequency of different cultivars. For instance, as wheat and barley are dietary substitutes, with barley more resistant to drought but generally considered inferior (Zohary *et al.* 2012: 52), changes in their relative frequencies may indicate climatic or economic stress. Similarly, the relative frequency of grape pips *vs* cereal grains should also be an indicator of the level of agricultural sophistication and commercial production. With the help of precision dating, such comparisons will enable us to trace the magnitude and time frame

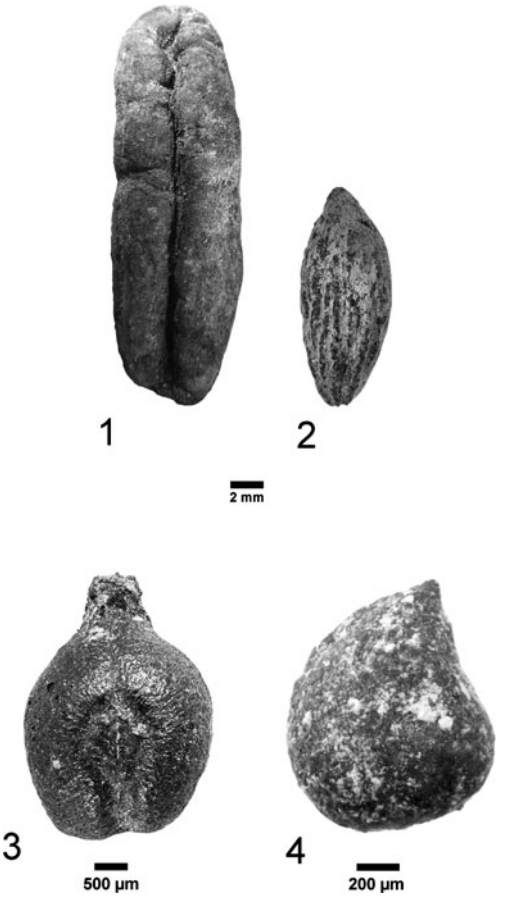

*Figure 3. Fruit crops: 1) Date (*Phoenix dactylifera*) stone; 2) olive (*Olea europaea*) stone; 3) grape (*Vitis vinifera*) pip; 4) fig (*Ficus carica*) nutlet. All remains were carbonised.*

of the region's agricultural decline. In addition, the influence of protracted climatic change, if it occurred, ought to appear as variation in the species composition of crops and wild plant remains. Meanwhile, the species composition of weeds, which grow alongside cultivated crops, may point to local cultivation or to the importation of crops. The seeds of the Byzantine Negev villages hold great promise for fruitful research on sustainability, collapse and resilience.

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