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A hoard of Nilotic nacreous shells from Egypt to Jericho (Early Bronze II, 3000–2800 BCE): Their finding, content and historical archaeological implications

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ABSTRACT
The Tell es-Sultan, ancient Jericho, is amongst the earliest “cities” that rose in the Southern Levant between the end of 4th and the beginning of the 3rd millennium BCE. The site is being excavated, studied and rehabilitated for tourism by Sapienza University of Rome and the Palestinian Ministry of Tourism and Antiquities since 1997. In 2017, during the 13th season of excavation, an unexpected discovery occurred: five Chambardia rubens shells have been found piled up in a dwelling unit dating back to the Early Bronze Age IB-II. The discovery is a tangible evidence of trade and cultural interconnections between the Southern Levant and Egypt, as these shells belong to a species that is only been found to live in the Nile. Moreover, chemical analysis, and thorough Scanning Electron Microscopy examination revealed that the shells contained Manganese Dioxide, an inorganic compound used as make-up ingredient in ancient Egypt, and available in the ores of the Sinai. These findings strongly support the existence of a link between the urban rise in EB IB-II through international trade of luxury goods, and are suggestive of the emergence at Jericho of a ruling elite that was influenced by Egypt.

KEYWORDS
Jericho; Egypt; Early Bronze II; Chambardia rubens; urbanisation; trade; Manganese dioxide

1. Introduction
Excavations at Tell es-Sultan, ancient Jericho (Palestine; Figure 1), located at the core of the homonymous oasis near the spring of ‘Ain es-Sultan (a 5000 litre × minute water resource: Nigro 2014c), are being carried on by the joint Italian-Palestinian Expedition of Sapienza University of Rome and the Ministry of Tourism and Antiquities (henceforth MOTA) of Palestine since 1997 (Nigro 2016). They were focused on the exploration of the Bronze Age city (c. 3400–1200 BCE), one of the oldest and more resilient urban sites of the Southern Levant (Nigro 2014a, 68–72).1 These initial explorations allowed the reconstruction of the city plan with its double-line city-walls and the identification of the city palace, its temple and the main street leading to the dense dwelling quarter on the northern plateau of the tell (Nigro 2016, Figure 8). Moreover, they made it possible to describe over a broad timeline a peculiar example of the urban rise and flourishing of a city as well as its final collapse and demise (Nigro 2013, 4–5; 2017).

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During the 2017 season, a hoard of five nacreous shells (Figure 2) was uncovered while cleaning a dwelling unit in the northern quarter of the town. The identification of the mussels’ species (*Chambardia rubens*) and the analysis of their content made it possible to establish a theory about their usage within their archaeological context and to hypothesize the significance of this finding in a much broader horizon of Jericho at the dawn of its urban experience.

The mussels were carefully removed along with their contents and the soil lump in which they were buried and safely transferred to the Museum of the Near East, Egypt and Mediterranean (www.lasapienzatojericho.it/Museo) at Sapienza University (see D. Montanari; § 3.). This transfer was made possible thanks to the kind courtesy of the MOTA. The shells content was sampled (T. Rinaldi) and analysed (F. Mura) by the CNIS (Center for Nanotechnology Applied to the Engineering of University La Sapienza; § 4.), suggesting
historical-archaeological reflections (§ 5.). After sampling, they have been carefully restored (S. Tricoli) and temporarily displayed in the Museum before they will be shipped back to the MOTA in Ramallah, Palestine.

2. The find spot: the stratigraphy, pottery and chronology of L.135

The shells were carefully recovered from a burnt collapse layer inside Locus 135, a room belonging to a dwelling unit (House D) ascribed to initial Early Bronze Age II (c. 3000–2900 BC), on the basis of its stratigraphy: it lay about 1 m underneath the overlying stone foundations of the Early Bronze IIIA city-walls (Nigro 2006, 363, fig. 22). The date of this context is corroborated by pottery finds from both Loci 135–136 (Nigro 2010, pl. XX:7–9), as well as by the stratigraphy of nearby Area F (Nigro 2010: 83–104). House D has a simple plan with two juxtaposed rooms (L.135, L.136) and a corridor/staircase. It is markedly different from the other nearby multiple-room houses (Figure 3). Due to
its location at a turn and bifurcation of the main street (Figure 4), it has then been surmised that it may have been a shop. The house was excavated by John Garstang, resuming an area previously explored by the Austro-German Expedition in 1908–1909 (Nigro 2010, 75, fig. 4.45).2

2.1. The hoard of nacreous shell in Locus 135

The shells were found within a small cache (Figure 5), consisting of 0.2 m wide hollow in floor L.135, buried by the destruction layer of the EB IIA. Inside the cache, the five nacreous shells were carefully piled up with the largest specimen broken at the bottom and the smallest on top.

3. The shells

The five shells found stacked one on top of the other are (Figure 6), from the top:

TS.17.F.1, consolidated, outer shell partially preserved, length 10.2 cm, width 6.1 cm, thickness min 0.1 cm max 0.4 cm, weight 25.83 g;
Figure 4. The main street and the EBII-III northern dwelling quarter at Tell es-Sultan, where the shells were found; from north-west.

Figure 5. Italian-Palestinian excavations. The EBII-III northern dwelling quarter at Tell es-Sultan, where the shells were found; from south-east.
TS.17.F.2, restored, outer shell partially preserved, length 11.1 cm, width 6.2 cm, thickness min 0.15 cm max 0.4 cm, weight 38.19 g;
TS.17.F.3, restored, outer shell partially preserved, length 12 cm, width 7.3 cm, thickness min 0.12 cm max 0.45 cm, weight 40.78 g;
TS.17.F.4, restored, outer shell partially preserved, length 11.95, width 8.35 cm, thickness min 0.1 cm max 0.5 cm, weight 51.69 g;
TS.17.F.5, fragmentary, outer shell not preserved, length (reconstructed) 11.9 cm, width (reconstructed) 8.2 cm, thickness min 0.18 cm max 0.5 cm, weight (preserved) 39.52 g.
These shells possibly constituted a set of increasing dimensions. The biggest specimen was at the bottom and the smallest on top.

3.1. Species identification

The five bivalve shells have been identified as specimens of Chambardia rubens arcuata (Cailliaud 1823), of the Mutelidae family, previously known as Aspatharia rubens and

Figure 6. The cache of five shells. Chambardia shells at the moment of discovery in L.135 at Tell es-Sultan, piled up in the cache.
Aspatharia rubens niloticus (Daget 1998; Reese, Mienis and Woodward 1986; Reese 2008), also called, at the beginning of the twentieth century, Spatha rubens (this is relevant for quotation in archaeological literature). Chambardia rubens is an aquatic bivalve shell species occurring in the Nile river and southwards deep into Africa south of the Sahara (Mienis 2004; van Damme and van Bocxlaer 2009, table 2). There is no evidence that Chambardia rubens has ever lived in the rivers of the Levant (Sharvit et al. 2002, 162). The presence of these shells in Tell es-Sultan/Jericho may, thus, constitute an indirect proof that they were imported from Egypt.

Figure 7. The five Chambardia rubens shells (TS.17.F.1-5) retrieved in Tell es-Sultan/ancient Jericho after restoration in the Museum of the Near East, Egypt and Mediterranean of Sapienza University of Rome.
Even though it has been suggested that Nilotic species such as *Chambardia* were only available during the 5th and 4th millennium BC, when the Pelusiac branch of the Nile reached northern Sinai (Tchernov 1988, 231–232; Butzer 2002; Stanley 2002; Bar-Yosef Mayer 2006), nonetheless, they may have been distributed throughout the Southern Levant over an extensive trade network used for distributing items or goods coming from Egypt (Braun and van den Brink 2008, 649; Mączyńska 2013, 199; Sala 2014, 66–67).

### 3.2. *Chambardia rubens* in Early Bronze Age Palestine

Importation of *Chambardia rubens* in Palestine dates back from the Natufian period (Mienis 1987), although regular arrivals started from the Chalcolithic Period in association with other Egyptian precious or symbolic items (carnelian beads, schist palettes, calcite or marble maceheads), with finds from several sites such as Abu Matar (Perrot 1955, 84), Horvat Beter (Dothan 1959, 31), Arad (Amiran 1978: pl. 118: 2; pl. 67:1) and Tulaylat al-Ghassul (Lee 1973, 307). During the Early Bronze Age I (3400–3000 BC), *Chambardia* unworked shells reached several sites of Southern Levant, showing a revival of the Egyptian connection during the Pre-Dynastic period: ‘Atlit (Chalcolithic-EBI; Sharvit et al. 2002); Tell el-Khuweilfeh/Tel Halif—Site H (MacDonald 1932, pl. XXVI), Azor (Ben-Tor 1975, 24, 28, pl. 24:3), Tell el Far‘ah North (de Vaux and Steve 1949, pl. 6b:4–5; de Vaux 1951, pls. 26a:3, 27b:1; 1952, pl. 17:3, 8), Tell el-‘Areini and Palmahim (Bar-Yosef Mayer 2002, tab. 7.1). This kind of imported items did not fade in Early Bronze II, with specimens from ‘Ain Assawir (Tomb 40: Bar-Yosef Mayer 2002, table 7.1), Arad (Amiran 1978, pls. 118:3–6, 119:2), and Bab edh-Dhra’ (Wilkinson 1989: 456, fig. 262:1), mainly found in tombs.

The largest number of *Chambardia rubens*, more than 20 specimens, was found in the Megiddo temple area in Early Bronze IA/Level J-2 (Bar-Yosef Mayer 2000, 480), Early Bronze IB/Level J-3, and in Early Bronze II/Level J-4 (Bar-Yosef and Baruch 2006, 501), and Early Bronze IIIA/Level J-6 (Bar-Yosef and Baruch 2006, 501; Ktalav 2013, 1216), where a cache Egyptian-style pottery vessels was also found (Ussishkin 2015, 86), with a noticeable concentration of mother of pearl shells (*Unio, Pinctada*, and *Chambardia*) in the back corridor of the Early Bronze II/Level J-4 Great Temple (Bar-Yosef and Baruch 2006, 503).

*Chambardia rubens* shells were considered luxury goods, due to their iridescent inner surface (mother of pearl/nacre), and they were used as containers for cosmetics, mainly kohl (mixed with animal fat), and in the manufacture of various precious personal items, such as combs, spoons, and pendants (Bar-Yosef Mayer 2002, 129–131). A specific and very interesting use in Egypt is as an ink palette for writing (Petrie 1927, 64); however, this cannot be proven for the Palestinian finds. Furthermore, nacreous shells may have also had an intrinsic value and it has been suggested that they were used as medium of payments analogous to money (Braun 2014, 224–225).

### 3.3. *Chambardia rubens* at Jericho

At Tell es-Sultan, ancient Jericho, *Chambardia rubens*, before the 2017 discovery, were found only in Tomb F4, an Early Bronze IB-II family tomb. Kenyon excavated several layers within this tomb, accounting for a very rich assemblage, characterised by the
presence of bone items (amulets, beads), and by a distinguished group of cult flutes made of pierced goat metacarpals (Kenyon 1960, 145–146, fig. 49, pl. VII: 273).

4. Sampling and analysing inside the shells

Black spots were visible on the inner side of all five specimens. The original content of shells, preserved in incrustation visible at naked eye inside them, was sampled from two shells (TS.17.F.1–2). On shell TS.17.F.1 (Figure 8), under a light grey-brownish micro-layer (0.3 mm thick) of sediment, a dark stratum (0.01 mm thick) was identified (Figure 9), identical to the black spots recognised in all of the mussels. Samples of both strata were taken in sterile conditions, and were observed under the Scanning Electron Microscopy (SEM micrographs and EDX spectra have been obtained using a FESEM Zeiss Auriga equipped with Bruker Quantax detector; for improving samples conductivity, they were coated with a 50 nm layer of chromium using the Quorum Q150 T ES sputter machine). The composition of both layers was, thus, identified (see below § 4.1).

4.1. Powdered manganese dioxide (MnO₂)

Elemental analysis of the upper micro-layer in shell TS.17.F.1 showed a composition of earth mineral like sulphates and silicates, i.e., dust constituting the surface of the incrustation. The lower black stratum, however, contained Manganese (Mn) and, directly over the mother of pearl surface (the black spots visible to the naked eyes), pure manganese dioxide was identified (MnO₂) (Figures 10–11). This substance, obtained from malachite/azurite/oxidized copper, was a basic pigment for several cosmetics and also for paint and ink. In association with vegetal or animal ointments, lead, and ash it was used in Egypt to produce kohl for eyes embellishment (Lucas 1930, 42).

Figure 8. Shell TS.17.F.1. The shell after cleaning and consolidation processes showing its nacreousv body.
5. The nacreous shells from Jericho: their historical-archaeological meaning

Analyses demonstrated that the five shells were imported from Egypt and that they were used as cosmetic containers, even though the fact that they had been piled up may indicate that they were to be reused or refilled. Manganese dioxide found inside them was
presumably quarried from mines in the Sinai (Umm Bogma, Serabit el-Khadim: el-Sharkawi, al-Aref and Abdel Motlib 1990; Segev, Beyth and Bar-Matthews 1992; Hauptmann 2007, 62; Beyth, Segev and Ginat 2013). This, of course, does not imply that the shells came from the same route (Tallet and Maruard 2012; Nigro 2014b, 41) (Figure 12).

The presence of imported Egyptian goods in Early Bronze IB and II Jericho, i.e., during the late Pre- and Early-Dynastic period in Egypt, is well known and evidenced — before our discovery — by calcite or marble mace-heads and schist cosmetic palettes (Sala 2012, 284–285). Our shells broaden the panorama of Egyptian imported goods at Jericho. Such Egyptian luxury items can be connected to the emergence of a sophisticated elite, which chose eye make-up (both for men and women) as a means of demonstrating rank. This phenomenon is also witnessed by finds of palettes (Greenberg, Wengrow, Paz 2010) and in Early Bronze II might be also related to the emergence of the “city”, a socio-economic system which accumulated wealth and invested it in international trade of precious goods (on this definition see note 1). The arrival at Jericho of such Egyptiaca starts in the incipient urban period (Early Bronze IB) and continues in the Early Bronze II, when the walled town was established, and the imitation of Egyptian status symbols also begun (Sala 2012, 284). The use of kohl-emphasised eyes, imitating high Egyptian officials, showed that the ruling elite was able to procure this precious material, thanks to long-distance trade practiced back and forth on the “Copper Route” to the Sinai (Nigro 2014b), where manganese bioxide ores were located (Figure 12). This was a major achievement of the urban economy and of its ruling class.

Mapping other Chambardia found in Southern Levantine sites (§ 3.2; not often taken into the account in old excavations) may thus provide further evidence not only about the
Figure 12. The “Copper Route”. Map illustrating supply points of manganese, copper, gemstones, and other precious stuff, and trade routes in the 3rd millennium BC, between Egypt and Levant, passing through the trade trigger site of Jericho.
geographic extent of the connection with Early-Dynastic Egypt (de Miroschedji 2002), but also the chronological duration of Egyptian cultural influence over the rising urban system of Southern Levant in the Early Bronze II-III (Nigro 2010, 4–5, 329).

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Notes

1. The terms "city" and "urbanism", the phenomena occurring in Jericho, as well as in several other sites in Southern Levant (Mazar 1992, 91–150), has been long debated and variously interpreted (these locations have been alternatively called "walled towns" or "walled communities": Harrison and Savage 2003; Savage, Falconer and Harrison 2007; Chesson 2015; contra Kafafi 2011; Nigro 2016, 9–10). What seems clear is that the social complexity, economic foundations and technological achievements of such Early Bronze Age II-III society marked a change in Southern Levant, even though they remained small-scale and did not developed in a way comparable with those found in Mesopotamia, Egypt and Syria (Weippert 1988, 155–181).

2. The British archaeologist who excavated the Early Bronze III dwellings inside the northern stretch of the Main Inner Wall deepened his sounding in a square area just to the east of this location. A century later, erosion had largely destroyed Early Bronze III structures, and even the Early Bronze II layers had been badly consumed. The Italian-Palestinian Expedition, thus, resumed cleaning all around the city-walls, and at the edge of Garstang’s North-East Trench uncovered the floors of L.135.

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