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TELL EL-DAB^{C}A: THE PROVISION OF AN EXPANDING SETTLEMENT WITH PLANT FOOD

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Founded in the early Middle Kingdom, the location was well selected. The settlement was built on the navigable Pelusic branch of the river Nile giving access to the Mediterranean Sea. An inland harbour facilitated the traffic flow. To the east it was shielded by the extensive Bahr el-Baqar drainage system. What was called the *Horus Road*, a land bridge across the marshes, connected Tell el-Dab^{c}a to the northern Sinai, thereby controlling all traffic by land and water from the Nile Valley across the eastern Delta and into Palestine and the Levant. Aeolian sand accumulations – turtle backs – rising above the annual flood plain offered ideal locations for settlement as well as horticulture, whilst the low lying land along the Pelusic branch of the Nile and several small canals provided fertile soil for agriculture. This geographic position acted not only as a gate to the Nile Valley across which merchandise passed, but also offered sufficient living space and arable land for an expanding population.

According to archaeological records as well as anthropological studies, the settlement soon attracted immigrants from the Levant who served as soldiers for the Egyptian crown, they worked as traders and were employed in mining expeditions to the Sinai, as seamen, ship builders and other specialists. Expansion of the town started as early as the late 12th Dynasty and, during the Hyksos period, it again doubled in size. During the reign of King Nehesi (c. 1710 BC), Avaris, as it was called now, became the capital of a small kingdom relying heavily on the Asiatic settlers in the region. Presumably around 1650 BC the Nehesy Dynasty was replaced by the Hyksos (15th Dynasty). The royal residence and, as a consequence, the power-centre was Avaris with an area under direct control of the Hyksos extending from the eastern Nile delta to southern Palestine. The rest of Egypt was linked to the capital by a loose system of vassals. The Hyksos were in power for more than hundred years. After the fall of Avaris (c. 1530 BC) life in town continued as usual. Neither a demographic shift, nor a severance of links with traditional trading partners is apparent – for example from ceramic records. During the Ramesside period the royal residence, Piramesse, was at Qantir, 2 km to the north of Avaris and during the New Kingdom Avaris and Piramesse were once again centres of trade with the Near East and the eastern Mediterranean region.[1]

As everywhere else in Egypt at the time, agriculture in Tell el-Dab^{c}a was based on emmer wheat[2] and barley,[3] beans, lentils and peas supplemented, in turn, by date, fig and grape, plus domestic animals; fish, fowl and game added variety.[4] With the exception of dates, the plants grown were part of the Near Eastern crop complex.[5] They were domesticated in a broad arc extending from Palestine across Anatolia and into Mesopotamia, known as the *Fertile Crescent* and reached Egypt during the Neolithic (c. 6th millennium BC) where agricultural production gradually replaced the traditional hunting and gathering mode of life.[6] Cereals were the staple diet throughout the Pharaonic period providing bread and beer[7] and fodder (mainly barley)[8] and probably several local races evolved. The harvest, by and large, depended on the annual Nile flood and inadequate floods were detrimental. Floods that were too high often resulted in the destruction of canals and dykes and those too low or short in duration left higher flood basins dry and others insufficiently saturated.[9] A low-yield harvest caused not only famine in the stricken areas, but also sparked political

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[1] For a general overview see, e.g., BIETAK 1996; for reports on the excavations see BIETAK, FORSTNER-MÜLLER, HEIN, JÁNOSI, and others in *Ä&L* 1–14; for a discussion of the chronology see BIETAK 2002.

[2] Scientific plant names are given in the appendix.

[3] Both two-rowed and six-rowed hulled barley are present; the occurrence of naked forms is questionable.

[4] BOESSNECK & VON DEN DRIESCH 1992.

[5] ZOHARY & HOPF 1988.

[6] HASSAN 1988, 147ff.; ZOHARY & HOPF 1988, 209; WETTERSTROM 1993, 201.

[7] SAMUEL 2000.

[8] MOENS & WETTERSTROM 1988; MURRAY 1994.

[9] BUTZER 1976, 17f.

unrest, especially at times when a series of insufficient Nile flood levels resulted in a depletion of food stores.[10]

The Egyptian language distinguishes between Upper and Lower Egyptian barley – *šmˁw jt* and *mhj jt*[11] – probably indicating a difference in quality and also possibly referring to local races. No such distinction is made for wheat – *bd.tj* – although frequent use of its dual form may indicate some differentiation.[12] Barley thrives on good soils but – in contrast to emmer wheat – is also able to tolerate some degree of aridity and salinity.[13] This would have made it the cereal of choice following insufficient Nile flood levels. It would have been grown on elevated field plots where flooding in irregular intervals might already have led to an accumulation of soluble salts in the upper soil layers, or after land reclamation.

Presumably flax or linseed, oil plants, vegetables, salad greens, condiments, spices and a variety of fruits were grown in Tell el-Dabᶜa as well but – with the exception of grape, fig and date – are missing in the sub-fossil record. We know from numerous representations in graves that flax used to be grown in fields and harvested by uprooting[14], a method usually applied when the crop is cultivated for its fibres. In Egypt the majority of textiles recovered from prehistoric times onwards are of linen.[15] Grape, fig and date were undoubtedly important parts of ancient Egyptian food production and, in almost every tomb-scene showing a garden, at least one of them is present.[16] Highly valued were also sycamore fig, persea, sugar date and Christ's thorn. Lettuce, onion, water melon, and spices were also grown in gardens.[17] The maintenance of gardens, vineyards and orchards needed a consistent water supply which was achievable, either by manually carrying water from pools and wells to the plots or by using a well sweep – *shaduf* – and by pouring the raised water into small canals leading to the area to be irrigated.[18] Generally, the archaeobotanical record of Egypt indicates that the availability of fruit and vegetables proliferated with time. This coincided with the influx of two major waves of new plant species after the first launch of the Near Eastern crop complex during the Neolithic. The first wave of inflows arrived in Egypt from the Second Intermediate Period onwards and brought with it such produce as olive and pomegranate. In a second wave – from the Ptolemaic period onwards – a variety of new crops, including apple, apricot and citron, reached Egypt.

In Tell el-Dabᶜa only charred plant remains are present. Unfortunately, any plant debris decays rapidly and is therefore lost for later recovery in areas where the soil is well aired and damp – at locations like the Nile Delta. In such areas preservation for several thousands of years is possible only in permanently waterlogged deposits or under toxic conditions or by charring, i.e. after contact with fire by which organic compounds are reduced to almost pure carbon. Cereal processing residues have often been burnt as fuel and the archaeobotanical record is therefore biased towards these in sites with exclusively charred plant remains. Fruit, vegetables, herbs and spices tend to be under-represented. They would often be eaten raw, with greens and pot herbs being most palatable before the plants budded. Even if fruits, leaves, bulbs or tubers came into contact with fire, they are likelier to have been destroyed, rather than charred. Consequently, the absence of garden plants from the sub-fossil record of Tell el-Dabᶜa is a result of the mode of preservation, of charring, and of subsequent taphonomic processes and is no indication of not being consumed.

According to ethnographic studies, all aspects of traditional agricultural production are closely intertwined. Cuttings from fruit trees serve as animal feed, as do by-products from the processing of cereals and pulses and waste from preparing vegetables for human consumption.[19] In particular, small hard items like weed seeds can survive digestion by domestic stock.[20] Animal dung is a valuable addition to, or even a substitute for, wood fuel – leaving the source of the charred plant remains at Tell el-Dabᶜa a matter of conjecture. They may have derived from burning animal dung as well as agricultural residues. By comparison with ethnographic models from Turkey[21] and Greece[22] it could be established,

[10] Schenkel 1978, 52.
[11] Hannig 1995, 111.
[12] Hannig 1995, 266.
[13] Zohary & Hopf 1988, 52.
[14] Steindorff 1913, pl. CLI.
[15] Vogelsang-Eastwood 2000, 269.
[16] Moens 1984; Baum 1988; Hugonot 1989.
[17] Moens 1984; Germer 1985; Hepper 1990; Murray 2000; Cappers 2002.
[18] Hugonot 1989; Eyre 1994; Davies 1927, T.28.
[19] Foxhall 1998.
[20] Miller 1984.
[21] Hillman 1984.
[22] Jones 1984.

that most samples constitute by-products from fine sieving plus some general plant waste. As a result, they contain mainly spikelet forks of emmer wheat, rachis fragments of barley as well as weed seeds small enough to pass through the sieve. Occasionally there are also cereal grains, pulses and the remains of fruits and nuts present.

An important component of the plant record from Tell el-Dab^{c}a is weed from arable fields. In the absence of modern herbicides, weeds will inevitably grow in fields and gardens. The types of weed and their abundance in traditional agriculture depend mainly on the crop itself, on the time of sowing, on soil conditions and on field management systems. Their growth can be controlled only by field rotation, by a sophisticated method of repeat ploughing at set intervals before sowing and by hand-weeding. There is no archaeobotanical, iconographic or written evidence in Egypt for any of these methods. Representations of cereal fields in tombs, however, show evenly growing fields of wheat and barley and no weed.[23] This may be bound up with the role of the representations, namely that of making the tomb-owner's after-life easier with abundant crops. This makes us think that we might be dealing here with an iconographic tradition rather than with a true picture of actual fields. In present-day Egypt cereals are usually densely sown, whilst weeds grow mainly in marginal areas, e.g. where the soil salinity is high or on stony spots within the fields or along their edges where they even can outgrow the crop. Weeds are often harvested together with the crop, especially when the culms are cut close to the ground. This was indeed the preferred harvesting method at Tell el-Dab^{c}a[24] and not – as often depicted in tombs – cutting at knee-height or just below the ears.[25]

Weeds compete with each other and with the crop itself for light, water, and minerals. The most successful weeds, i.e. the ones highest in number, will therefore be those which can best cope with a given situation – wet or dry soils, high level of salinity and lack or abundance of nutrients, etc. Past living conditions in fields can be assessed by reference to the present-day distribution and ecological requirements of a species. The most striking feature about the weed assemblage from Tell el-Dab^{c}a is the gradual decline of monocotyledons producing bulbs, mainly hyacinth, grape hyacinth and ornithogale. Nowadays these taxa are (very) rare in Egypt and the few species growing as weed show a preference for sandy soils and barley fields.[26] At the same time, weeds producing rhizomes become more salient. Explanations for this apparent shift in the weed flora may be found in the different responses of bulbs and rhizomes to regular ploughing. Whilst some bulbs are very vulnerable, plants producing rhizomes are furthered in their propagation on fragmentation of their underground organs. Alternatively, these changes are also likely to be either the result of different irrigation techniques – water being kept in the field plots over an extended period – or the result of soil improvement.

Another important aspect of the sub-fossil record of Avaris is the importing or introduction of fruit and nut varieties.[27] From the late Hyksos period onwards, remains of pomegranate, olive, almond and pistachio are present in the samples coinciding with the settlement's active links with the Levant. Pomegranate and olive turned into important trees in the New Kingdom and feature prominently in the iconographic record of that period. Olive trees provide oil and fruit and, in particular, the oases of the Western Desert became famous for their high-grade olive oil that is still produced today. The cultivation of almond and pistachio, however, was less successful.

The conclusion that can be drawn is that Tell el-Dab^{c}a reflects in its material culture not only a thriving community with active links with the Levant. The same is also true of its agricultural production and importing or introduction of new plants. Staple foods, as well as fruit and vegetables, were grown in the area. Olive oil or olives, pomegranates and other foreign plant products used to be imported from the Levant. Whether the inhabitants of Avaris already were engaged in the cultivation of olive and pomegranate in the late Second Intermediate Period deserves further investigation. How long Tell el-Dab^{c}a was a self-sufficient community is still uncertain but, from the Hyksos period onwards at the latest, cereals from the Levant, possibly tribute payments, reached the settlement.

[23] Petrie 1892, fig. 28.6.
[24] Thanheiser 1987, 78.
[25] Davies 1901, frontispiece.
[26] Täckholm 1974, 637ff.
[27] Thanheiser 1987, 50ff.; Thanheiser 2004, 378.

APPENDIX – ALPHABETICAL LIST OF SCIENTIFIC PLANT NAMES

almond	*Amygdalus communis* L. (syn. *Prunus dulcis* (Miller) D.A. Webb, *Prunus amygdalus* Batsch.)
apple	*Malus* Mill.
apricot	*Prunus armeniaca* L.
barley two-rowed	*Hordeum vulgare* L. ssp. *distichum*
barley six-rowed	*Hordeum vulgare* L. ssp. *vulgare*
bean	*Vicia faba* L.
Christ's thorn	*Ziziphus spina-christi* (L.) Willd.
citron	*Citrus medica* L.
date	*Phoenix dactylifera* L.
emmer wheat	*Triticum turgidum* L. ssp. *dicoccon* (Schrank) Thell. (syn. *T. dicoccum* Schübl.)
fig	*Ficus carica* L.
flax, linseed	*Linum usitatissimum* L.
grape	*Vitis vinifera* L. ssp. *vinifera*
grape hyacinth	*Muscari* Hill.
hyacinth	*Bellevalia* Lapeyr.
lentil	*Lens culinaris* Medik.
lettuce	*Lactuca* L.
olive	*Olea europaea* L.
ornithogale	*Ornithogalum* L.
onion	*Allium cepa* L.
pea	*Pisum sativum* L. ssp. *sativum*
persea	*Mimusops laurifolia* (Forsk.) Friis.
pistachio	*Pistacia vera* L.
pomegranate	*Punica granatum* L.
sugar date	*Balanites* aegyptiaca (L.) Del.
sycamore fig	*Ficus sycomorus* L
water melon	*Citrullus lanatus* (Thunb.) Mansf.

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