The Standard of Living of the Judean Military Colony at Elephantine in Persian Period Egypt

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Abstract
The settlement of Judean military colonists at Elephantine island at the southern border of Egypt is by far the best-documented foreign community in this province of the Persian empire. The religious life of this military colony as well as the tension between the Judeans and the priests of the local god Khnum culminating in the destruction of the local temple of Jahu at the end of the 5th century BCE have been in the focus of scholarly discussion for decades. Recent excavations at Elephantine Island and Syene (modern Aswan) indicate that the settlement of foreign colonists there was organized by the Persian administration including the creation of entirely new living quarters. Both the Aramaic papyri as well as the archaeological record provide deeper insights into the daily life and living conditions of these colonists. This paper discusses rations disbursed to military colonists at Elephantine as well as household sizes as proxies for the standard of living of the Judean settlers at Elephantine.

Introduction
The Aramaic papyri discovered by Otto Rubensohn and Friedrich Zucker at the island of Elephantine in 1906–1908 have been attracting the interest of scholars for more than 100 years because of principally two reasons: 1) The papyri indicate the existence of a temple of Jahu besides the one in Jerusalem, thus raising questions on the nature and religious life of the Judean settlement living at the southwestern periphery of the Persian Empire. 2) Two drafts of a petition in the archive of Jedaniah son of Gemariah include a vivid description of the destruction of the Yahu temple at Elephantine at the end of the 5th century BCE. The fact that the priests of the nearby temple of the ram-headed local god Khnum played a major role in this conflict indicates religious motives that led to the destruction of the temple. The reconstruction of the religious life of the Judeans at Elephantine is still in the focus of the scholarly discussion of the Elephantine papyri although most of the documents are legal documents, lists, accounts, letters, etc. referring to the daily life as well as legal issues of these military colonists.

Additionally, new source material has been published since the discovery of the Aramaic papyri from Elephantine:

- The Aramaic ostraca excavated by a French mission on the eastern part of the southern Kom of Elephantine published in 2006—almost 100 years after their discovery—mostly consist of lists and letters reflecting matters of daily life of the Judean settlement.
- The excavations of the German and Swiss Archaeological Institutes contributed not only to the identification of the Yahu temple but also to a better understanding of the living quarters of the military colony.
- Recent excavations of a garrison town surrounded by a great wall in the Persian period by the Swiss Institute at Aswan revealed that living quarters with houses similar to those at Elephantine were erected simultaneously at Syene.

In order to explore the full potential of the papyrological and archaeological evidence from Elephantine for a history of foreign settlements in the Persian Empire, it is necessary to ask new questions and to apply new methods. Economic history, currently being subject of a revival in ancient history, provides research questions (e.g., on demography, economic growth, standards of living) and methodological approaches (e.g., quantifications, proxies, new institutional economics) that may be applicable to our material. In this paper, I will discuss rations disbursed to military colonists at Elephantine as well as household sizes as proxies for the standard of living of the Judean settlers at Elephantine.
Wheat Wages

In recent years, several methods were developed to compare standards of living on the basis of quantifiable data. Robert Allen, for instance, introduced the concept of welfare ratio/consumption baskets. For this purpose, he calculated the daily wages of a laborer as well as the costs of supporting a family. The so-called “consumption basket” includes all items that a family would supposedly consume in the course of a year. By multiplying the quantities of items with their actual prices, Allen was able to estimate the costs of living for a family. By comparing the costs of living with the yearly income of a laborer, he established the so-called welfare ratio indicating how much of these costs were covered by the income of the laborer. Walter Scheidel, however, criticized Allen’s approach because of the lack of relevant data for many regions and time periods in antiquity. In his opinion, only Roman Egypt would provide sufficient data for this method. Even the basis for Allen’s consumption basket, Diocletian’s price edict (301 CE) setting price maxima for different goods, did not reflect real prices, as Scheidel demonstrated by comparison with data from Roman Egypt.

As an alternative approach, Scheidel proposed the concept of wheat wages. He defines wheat wage as “the daily wage of an unskilled laborer expressed in liters of wheat.” The idea is to convert the wages of workers into wheat equivalents and to calculate the daily wage of a worker in kind. In doing so, it is possible to compare wages from different regions and time periods no matter if paid in silver or in kind. Due to the work of Scheidel, a broader data set is already available: His analysis revealed comparably high wages for Babylonia in the Neo-Babylonian Period (9.6–14.4 l) or Classical Athens (8.7–15.6 l), Byzantine/early Arabic Egypt (7.7–13.4 l), and high medieval Cairo (7.5–13.5 l), but relatively low wages for Ptolemaic Egypt (3.2–6.2 l). Scheidel notes that most estimates fall within a core range of 3.5–6.5 liters of wheat per day.

Although it is well documented that the military colonies at Elephantine and elsewhere received a salary (prx) in silver, the exact amount of silver per month is unknown. But they were also provided with rations in kind (pip), as some documents show. TAD C3.14, a fragmentary account, reveals that the garrison at Syene was provided with barley coming from the provinces of Thebes and the Southern District. Moreover, it contains an account on the disbursement of barley to different groups of people:

(26) [k]l npS 20 20 2 lHd S
(26) [A]ll (told) 54 souls. Herein—

(27) [2] lHd š 1 r 2 lHd 3
(27) [2]: for (each) one b(arley), 1 a(rdab), 2 q(quarters amounting) to b(arley), 3 a(rdabs);

(28) 20 2 lHd š 1 lŠ 20 2
(28) 22: for (each) one b(arley), 1 a(rdab) to b(arley), 22 a(rdabs);

(29) [n]pS 20 10 lHd š 1 [r 2 l]š 20 20 10 5
(29) 30 [s]ouls: for (each) one b(arley), 1 [v] (2) a(rdab), [2 q(arters) to b(arley), 75 a(rdabs).

(30) kl npqt ſyw [...]
(30) All the outlay [...][...]

(31) š 100
(31) b(arley), 100 a(rdabs).

While 22 persons received a minimum ration of 1 artaba per month, 30 persons got a maximum of 2.5 artabas per month. In order to compare these data with other regions and time periods, it is necessary to convert the rations of barley (in artabas) into wheat wages (in liters). Thus, we need to know the exact size of an artaba and the ratio of barley and wheat in terms of their caloric value. Although it is widely accepted that the Persepolitan artaba equals ca. 30 liters, the exact size of an artaba in Persian Period Egypt is actually subject of discussion. The artaba was a dry measure introduced in Egypt under Persian rule, as our account as well as other Aramaic texts show. Vleeming pointed out that the Egyptian artaba attested in demotic texts of the Ptolemaic Period was in some cases larger in size than the Persepolitan one (40 liters). Although the Aramaic documents from Persian period Egypt give no hint on the actual size of the artaba, I assume that the measure used by the Judean settlers at Elephantine was similar to the Persepolitan one (ca. 30 l).

As for the caloric value of barley and wheat, scholars refer to different numbers. Although the caloric values of 1 kg of wheat and barley are quite similar, differences occur when calculating with liters because of the specific weight of both cereals. Thus, Scheidel and Michael Jursa assume that 1 liter of barley equals 0.8 liter of wheat in terms of caloric value. On the basis of this assumption, it is possible to calculate the wheat wages of the different groups of recipients (Table 1).

<table>
<thead>
<tr>
<th>BARLEY IN ARTABAS/MONTH</th>
<th>BARLEY IN LITERS/MONTH</th>
<th>WHEAT IN LITERS/MONTH</th>
<th>WHEAT IN LITERS/DAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>30</td>
<td>24</td>
<td>0.8</td>
</tr>
<tr>
<td>1.5</td>
<td>45</td>
<td>36</td>
<td>1.2</td>
</tr>
<tr>
<td>2.5</td>
<td>75</td>
<td>60</td>
<td>2</td>
</tr>
</tbody>
</table>

TABLE 1: Rations mentioned in TAD C3.14 converted into daily wheat wages.
The comparison of these numbers with wheat wages from other regions or time periods reveals that the provision of the military colonists of Elephantine with rations of barley of 0.8–2 liters per day was relatively low and is even lower than the very modest numbers from Ptolemaic Egypt. It definitely does not reach Scheidel’s core range of 3.5–6.5 liters per day.

**Caloric Value of Rations**

Another approach is to estimate the caloric value of the barley rations. The basic question is how many people could have been fed through the caloric value of the monthly rations. For this purpose, it is necessary to convert the liters of barley into their corresponding weight that is the basis for the calculation of the caloric value: 1 liter of barley corresponds to 0.62 kg because of the specific weight of barley, with 1 kg barley providing 3,320 kcal. Based on these assumptions, it is possible to calculate the caloric value of each ration per month/day (Table 2).

### Table 2: Caloric values of the rations mentioned in TAD C

<table>
<thead>
<tr>
<th>BARLEY IN LITERS/MONTH</th>
<th>BARLEY IN KG/MONTH</th>
<th>BARLEY IN KCAI/MONTH</th>
<th>BARLEY IN KCAI/DAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>30</td>
<td>18.6</td>
<td>61,742</td>
<td>2,058.4</td>
</tr>
<tr>
<td>45</td>
<td>27.9</td>
<td>92,628</td>
<td>3,087.6</td>
</tr>
<tr>
<td>75</td>
<td>46.5</td>
<td>154,380</td>
<td>5,146.0</td>
</tr>
</tbody>
</table>

Many scholars assume that the average need for calories would be about 2,000 kcal per day. Thus the basic ration of 1 artaba of barley per month would be sufficient to feed one person, but not a whole family. The papyri inform us that the military colonists lived with their families at Elephantine, as we shall see below in the section on housing. Therefore, it is reasonable to compare the rations with the caloric needs of a nuclear family. If we assume a caloric need of 7,300 kcal per day for a family of four, even the highest ration would not be sufficient to feed the whole family. Jursa, for instance, assumes that the monthly ration of 90 l of barley attested for Uruk may be sufficient for a family of four persons. On the other hand, the payment of 1 artaba barley (or 30 l) is also attested as remuneration for kurtaš workers in Persepolis.

How can we explain these relatively low rations? On the one hand, women at Elephantine probably received rations for themselves (cf. TAD B5.5). Thus, their rations were also part of the monthly income of a family at Elephantine. On the other hand, military colonists received payments (pry) in silver as a number of documents from Elephantine and elsewhere demonstrate. Hitherto no document is known mentioning the amount of silver the military colonists received as a salary. This money, however, was certainly used to buy supplementary food and other things of daily use. Regular payments in silver also explain the important role that silver played in the economic life of the Judeans at Elephantine. Legal documents like sales, loans, dowries, etc., as well as several letters, demonstrate the high degree of circulation of silver and its important role for business activities.

### Household Size

The comparison of costs/incomes is a relatively simple approach to discuss living standards in ancient societies. Ian Morris discussed the following proxy data for living standards: stature, nutrition, mortality/life expectancy, disease patterns, and housing. For our purpose, the aspect of housing may be of special interest. Two different categories are distinguishable: house size and house inventories. According to Morris, increasing house sizes and far richer house inventories are indicators for changing consumption patterns and an increasing standard of living. Especially, dowry lists provide valuable information on actual prices for different goods and give an impression of the relative wealth of a household. Jursa, for instance, compared dowry lists of the Old and Neo-Babylonian Period in a diachronic perspective. He came to the conclusion that dowries of the Neo-Babylonian Period included greater quantities of metal objects (e.g., bronze vessels, but also silver money) than those of the Old Babylonian Period. This tendency corresponds to the increasing size of houses in the same time period. In a synchronous perspective, dowry lists may provide useful information on social inequality. Michael E. Smith, for instance, differentiates three categories to estimate the relative wealth of a household: diversity, value, and origin of goods. Both proxies, house size and house inventories, are to some extend available for Elephantine.

In this paper, I would like to confine myself to the size of houses at Elephantine as witnessed by the archaeological and papyrological record. As mentioned above, the living quarters of the Judeans at Elephantine have been re-examined by Achim Krekeler in the late 1980s. The Judean quarter at Elephantine (Fig. 1) consisted of compact multi-storey buildings that were probably built in a short period of time on the leveled remains of the older building layer. According to the excavator, the use of standardized mud bricks indicates that there was a centralized supply with building material. The Judean quarter was probably built on behalf of the Persian rulers in order to settle military colonists there.

Two types of houses are distinguishable: The one-party-house and the double-house. These houses were separated by narrow streets. This new type of house differed considerably from older one-storey houses and allowed settlement of a dense population on a limited space at Elephantine. The houses M, Q, and Z provide examples of a simple house consisting of three rooms covering an area of approximately 30 m²: an entrance room with staircase, a dwelling, and a sleeping room. A saddle quern in the entrance area is attached to each housing unit. In the course of the 5th century BCE, the houses were modified...
by installations of inner walls and staircases in order to create new housing units.

House M (Fig. 2) is a good example for the development of these houses in the course of the 5th century BCE. House M (54 m²) originally consisted of two roofed rooms and an open court including two troughs. The walls of the former one-storey house were built of 2–1½ rows of mud bricks. In a second building phase, the house unit originally intended for one family was transformed into two separate units by the installation of supplementary walls. The western unit consisted of an entrance unit with saddle quern (M3), a staircase (M2), and a room that can be identified as a workshop according to the findings of vessels, two unfinished stelae, tools, etc. (M1). In room M7, 44 almost complete vessels were found, some of them resembling those of the so-called Aramaean house (house G). The eastern unit consisted of an entrance room with saddle quern and a staircase in the northeastern corner (M5). Several terracotta figurines were found in this room. The other room (M4) is characterized by a fireplace. According to the excavator, an increasing population or divisions of property may have been the reason for these modifications.

It is also possible to refer the archaeological record to the papyrological evidence: Based on the dimensions mentioned in TAD B2.3, Cornelius von Pilgrim was able
to correlate the rather small house of Mahseiah/Mibtahiah (39.88 m²) with the remains of house MA in the archaeological record. Consequently, he identified the two units of house M with the houses of Dargamana and Hosea. Mahseiah possessed another house that he handed over to Mibtahiah in 446 BCE (TAD B2.7). This house is to be identified with the northeastern part of house O in the archaeological record—just opposite house G (the “Aramaean house”) where Rubensohn and Zucker found several amphoras.

The papyrological record also allows the reconstruction of the lifecycle of a house at Elephantine as the archive of Ananiah son of Azariah shows: In 437 BCE, two Caspians, Bagazuhta and Ybl, sold the abandoned house of [pwly to Ananiah for 1 karsh and 4 shekels (TAD B3.4). The courtyard of this house was not built yet and there were no beams in the windows. The Caspians obviously did not hold any legal title to the house. Therefore, the legal document includes an extensive defensive clause against third-party claims. Three years later (TAD B3.5; 434 BCE)—the time period necessary to get clear title on a property according to Egyptian law—Ananiah gave half of a large room and a chamber (11 x 7 1/3 cubits = ca. 81 area cubits [42,525 m²]) to his wife Tamet. In 420 BCE (TAD B3.7), Ananiah gave another room, as well as half of the courtyard and the staircase, to his daughter Jehoilishma. In 404 BCE (TAD B3.10), he arranged that Jehoilishma would inherit the southern room (8 ½ x 7 cubits = 59 ½ area cubits; total: 98 area cubits [51,45 m²]), as well as half of the courtyard and the staircase after his death. Finally, he gave it to her immediately (TAD B3.11; 402 BC). In the same year, Ananiah and his wife Ta[pajmet sold the remaining parts of the house (150 area cubits [78,75 m²]) to his son-in-law, Anani son of Haggai, for 1 karsh and 3 shekels. Anani noted that he delivered the old document written on behalf of Bagazuhta.

Both house M and the archive of Ananiah demonstrate that the original houses at Elephantine were modified considerably in the course of time. The foundation of new households may have been a mayor incentive to divide larger houses into smaller apartments. The archaeological and papyrological record, however, provides us with a number of house sizes as Table 3 shows.

The archaeological record shows that the houses or apartments at Elephantine had a rather modest size of 33–65 m². This general picture is confirmed by the papyrological evidence indicating that these apartments were inhabited by nuclear families of 4–5 persons. The houses at Elephantine are smaller than contemporary civilian houses in Egypt or Babylonia.

Table 3: House/apartment sizes according to the papyrological/archaeological record.

<table>
<thead>
<tr>
<th>House/apartment</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>House Q</td>
<td>33 m²</td>
</tr>
<tr>
<td>House Z</td>
<td>36 (49) m²</td>
</tr>
<tr>
<td>TAD B2.3–4 (House MA)</td>
<td>39.88 m²</td>
</tr>
<tr>
<td>TAD B3.5</td>
<td>42.525 m²</td>
</tr>
<tr>
<td>TAD B3.10</td>
<td>51.45 m²</td>
</tr>
<tr>
<td>House M</td>
<td>54 m²</td>
</tr>
<tr>
<td>House J</td>
<td>65 m²</td>
</tr>
<tr>
<td>House P</td>
<td>65 m²</td>
</tr>
<tr>
<td>TAD B3.11</td>
<td>78.75 m²</td>
</tr>
</tbody>
</table>
Recent excavations in Egypt reveal that the Judean quarter at Elephantine was by no means an exception. The Swiss Institute, for instance, excavated buildings at Syene dating to the Persian Period resembling those at Elephantine in design and dimensions. Similar observations were made by the excavators of Tell el-Herr, a fortress of the Persian Period in northwestern Sinai. In the last quarter of the 5th century BCE, house units characterized by their uniform shape were built within the fortress: House type III (Fig. 3) is of almost quadratic shape and consists of three rooms. This house type is comparatively small (ca. 25 m²), providing space for a maximum of 1–2 persons. In contrast to the houses at Elephantine/Syene, there are no traces of a staircase leading to a second storey that would have provided supplementary space. A functional analysis of the rooms within the houses allows an identification of kitchens, living rooms, and storage rooms.

Within the fortress, the houses were arranged in insulae consisting of two rows of houses of type III attached to each other. The overall design of the quarter indicates that it was built on behalf of a central authority, as is the case for the Judean quarter at Elephantine.

The entirely new design of these house units compared to contemporary houses in Egypt must have had a considerable impact on the organization of social life. The houses were no longer closed units consisting of rooms concentrating around an inner courtyard, but were open to the outside world through windows that were necessary to regulate the climate of these compact buildings. Due to the smaller size of the ground floor, there was the tendency to build multi-storey houses. Because of the limited space for domestic activities, in both Elephantine and Tell el-Herr there were special buildings with batteries of ovens for the production of bread that were probably commonly used. Moreover, there is evidence that the quarter in the western sector of Tell el-Herr was specialized in the production of garments. Production facilities were also part of the settlement at Elephantine, as the workshop in house M discussed above shows. It is not clear if these production units were intended for the supply of the military settlement only or also for commerce.

**Conclusions**

This paper discussed different approaches in order to evaluate the standard of living within the military colony at Elephantine. The observations made on rations disbursed to the military colonists as well as household sizes at Elephantine can be summarized as follows:

The provision of the military colonists with rations of barley was relatively modest compared with other regions and epochs, as the application of the concept of wheat wages on data from an account regarding the disbursement of barley shows. A calculation of caloric value of these monthly payments of barley revealed that they were not sufficient to feed a whole family. The Aramaic papyri, however, show that the colonists lived with their families at Elephantine/Syene. Thus, only the combination with payments in silver may have provided a sufficient income for them. The supply with silver is reflected by many references to silver as a means of payment in economic transactions among the Judeans of Elephantine.

Recent archeological investigations indicate that the building of the settlement was organized by a central authority at the beginning of the Persian Period in Egypt. This settlement consisted of modest houses sufficient to house nuclear families of 4–5 people. A comparison with excavations at Syene and Tell el-Herr indicates that the living quarter at Elephantine was an example for a more or less uniform type of settlement for foreign military colonists in Persian period Egypt. The rather modest buildings at Elephantine (33–65 m²) constituted an entirely new type of housing with considerable consequences for the organization of social life.

Archeological and papyrological evidence shows that, in the course of time, the Judeans of Elephantine divided parts the house units to provide apartments for new households. Although the overall design of houses at Tell el-Herr was similar to those at Elephantine/Syene, the purpose of the quarters at Tell el-Herr was not housing whole families because the house units provided only space for one or two persons. The archaeology in Elephantine and Tell el-Herr indicates that, due to the limited space, commonly shared facilities were in use (e.g., for bread production). Additionally, specialized zones for leather production are observable at Tell el-Herr.

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University of Bonn. I thank the participants of the workshop as well as Dr. Renate Müller-Wollermann for their comments and suggestions.


Cf. the discussion below.


21 For the discussion of these numbers, see Rainer Nutz, Ägyptens wirtschaftliche Grundlagen in der Mittleren Bronzezeit, Archaeopress Egyptology 4 (Oxford: Archaeopress, 2014), 155–157.


23 1 kg barley equals ca. 0.6 kg; 1 kg wheat ca. 0.75 kg; Nutz 2014, 155–156.


26 Foxhall/Forbes 1982, 46; see also Bowman 2013, 247; Nutz 2014, 156–157.


28 Cf. Jongman 2007, 599: 1 man 2,600 kcal + 1 woman 2,100 kcal + 2 children 1,300 kcal; Bowman assumes 13,000 kcal per day for a family of 5 persons (Bowman 2013, 248).

29 Jursa 2015, 359.

30 Cf. note 14.


33 E.g., TAD B2.5, B2.6, B3.3, B3.8 (dowries); TAD B3.1, B4.2, B5.5 (loans); TAD B3.4, B3.12 (sales). For the letters, cf. TAD A2.2; A2.6; A3.8; A4.10.


35 Jursa 2010, 810.


40 Cornelius von Pilgrim, “Textzeugnisse und archäologischer Befund. Zur Topographie


42 Müller 2008, 315–327, esp. 316 fig. 3: house 4: 50 m²; house 5: 58 m².

43 Séverine Marchi, L’habitat dans les forteresses de Migdol (Tell el-Herr) durant les Ve et IVe siècles avant J.-C. Étude archéologique (Paris: Presses de l’université Paris-Sorbonne, 2014) with further literature. Tell el-Herr may be identical with Migdol, a fortress mentioned in the Aramaic letter TAD A3.3 (Marchi 2014, 6).

44 Marchi 2014, 40–41.

45 Marchi 2014, 189.

46 Marchi 2014, 163–164.