

### Summary and discussion

The excavations of 1976 provided material for dating and bioarchaeological remains which help to clarify the chronology and subsistence of this important site. Two dates were added to the ten obtained by Olsson.<sup>16</sup> Evaluation and correction of the twelve dates indicates that the initial occupation of the site occurred during the beginning of the fifth millennium BC. It also suggests a rate of about 20 mm a year for the accumulation of site material, and a duration of about 900 years of occupation. The average date of Nagada I in the Nagada region is c. 3750 BC, and that of Nagada II is c. 3500 BC.<sup>17</sup> The beginning of the Neolithic occupation at Merimda thus antedates Nagada I by about a millennium. Baumgartel's<sup>18</sup> contention that Merimda dates from the Nagada II period to the Early Dynastic period is unfounded. The chronology presented here supports the view of the majority of prehistorians who regard Merimda as an earlier settlement than Nagada I-II. The early dates on the Fayum Neolithic of c. 5200-4500 BC<sup>19</sup> are congruent with the view that Merimda, in its early stages, was closely associated with the Fayum Neolithic.<sup>20</sup>

The subsistence activity of the Merimda Neolithic people consisted of mixed farming and herding. The plants cultivated were predominantly wheat and barley. Herd animals included sheep/goats, cattle, and pig. This subsistence base is similar to that associated with the Predynastic of Upper Egypt at Nagada and Hierakonpolis.<sup>21</sup> It is interesting to note that in all these sites the frequency of wild animal game, except aquatic resources and occasionally birds, is minimal.

The sediment analysis of the deposits at Merimda indicates that the site rests on a palaeosol overlying colluvial gravel representing slope wash from the adjacent Pleistocene terrace during the main Holocene wetter period. The drift sand overlying the Pleistocene terrace contains Middle Palaeolithic artefacts. The deposits of the site consist of medium-grained sand, mostly of aeolian origin, admixed with about 10 per cent of silt, most likely derived from cultural debris. The settlement at the time of occupation thus stood above the effective level of Nile floods. Merimda Beni Salama is one of the earliest agricultural settlements along the Nile in Egypt. The ongoing research by the German Archaeological Institute will be of great importance in understanding the early stages of agricultural developments in Egypt.

<sup>16</sup> Ibid.

<sup>17</sup> Hassan, *African Archaeological Review* 3 (1985), 95-116.

<sup>18</sup> E. J. Baumgartel, *CAH* 1, ch. ix(a).

<sup>19</sup> Hassan, *African Archaeological Review* 3, 95-116.

<sup>20</sup> Hayes, loc. cit.

<sup>21</sup> Hassan, *The Predynastic of Egypt: Subsistence in Settlement Studies in the Nagada-Khatana Region* (1981). Report to the NSF, Washington, DC; M. A. Hoffman, *The Predynastic of Hierakonpolis* (1982). Egyptian Studies Association, Publication No. 1. Cairo University Herbarium, Egypt.

## A QUANTITATIVE ANALYSIS OF THE PREDYNASTIC BURIALS IN ARMANT CEMETERY 1400-1500

By KATHRYN BARD

Cemetery 1400-1500 at Armant, excavated by Mond and Myers in the 1930s, is the best-recorded Predynastic cemetery in Egypt. With burials dating to Nagada I, II, and III, the cemetery provides data for a crucial period of social evolution in Egypt. Quantitative methods of analysis show that both mean grave size and mean number of grave goods increase through time. Although clusters of graves show differentiation into two basic hierarchies of grave types, there is a lack of overall complexity in the Armant burials, probably indicative of a society which was not very stratified.

THE Predynastic cemeteries of Armant are located about 9 km south-west of Luxor, on the west bank of the Nile. Of the numerous Predynastic cemeteries excavated in Upper Egypt during the first half of this century, these are the best documented. In addition, Kaiser has developed a seriation system for Predynastic pottery based on the sequence of graves at Armant. For these reasons, these were chosen for quantitative analyses. The initial goals were to develop generalizations concerning patterns in cemetery evolution for the Egyptian Predynastic, and to determine the level of social organization at Armant and changes in this through time.

The cemeteries of Armant were excavated by Mond and Myers in the early 1930s. According to them, there were graves from the early Predynastic through the Old and Middle Kingdoms, with a few Coptic burials.<sup>1</sup> The main Predynastic cemetery was in area 1400-1500, but some Predynastic graves were also located in area 1300, and around two Middle Kingdom tombs. The cemeteries lie beyond the present edge of cultivation on the low desert fringe, but the excavators suggested that the climate was wetter in Predynastic times than today.<sup>2</sup> They found remains of large trees throughout the site (acacia and *Ficus sycomorus*), and sometimes roots had been cut out for Predynastic burials.<sup>3</sup> It was therefore assumed that these tree remains were of Predynastic date. They were 20 feet or more above the present cultivation level, and would have required rainfall or a higher Nile flood level to grow. According to Butzer, there were two major episodes of higher Nile floods and accelerated alluviation: 'high ca. 5000-3700 BC, then temporarily lower, with another major episode of high floods and accelerated alluviation culminating about 3000 BC'.<sup>4</sup>

Mond and Myers excavated a Predynastic village in area 1000, at the edge of

<sup>1</sup> Sir Robert Mond and Oliver H. Myers, *Cemeteries of Armant*, 1 (London, 1937), 1-9.

<sup>2</sup> Ibid. 78.

<sup>3</sup> Karl W. Butzer, *Early Hydraulic Civilization in Egypt* (Chicago, 1976), 13.

<sup>4</sup> Ibid. 7.

present-day cultivation.<sup>5</sup> The settlement pottery differed from that in Cemetery 1400-1500. Distributed throughout all levels in this settlement was a ware with 'point-burnished' decoration on the inside, 'similar to, but coarser than that found on the Badarian'.<sup>6</sup> Area 1000 is 2 km from Cemetery 1400-1500, however, and the cemetery next to it had been destroyed by later graves. A Predynastic settlement slightly below Cemetery 1400-1500, south-east by south, was not excavated.<sup>7</sup>

Several general observations about Predynastic Cemetery 1400-1500 were made by the excavators. The earlier graves were rough ovals, while the later ones were rectangular. The earlier part of the cemetery was lower down the spur, closer to the edge of cultivation. The Predynastic graves seem to have been oriented to the river: burials were aligned north-south where the river is straight, but were erratic where it bends. Most of the Predynastic burials were facing west or south. There was a recognizable decline in the use of matting with bodies after (Petrie's) SD 56.<sup>8</sup>

Although much specific information about the graves in Cemetery 1400-1500 is given in Mond and Myer's publication, there are omissions. Grave dimensions are sometimes missing. Only 48 per cent of the listed graves had the age/sex of the human remains determined, and of these, the only categories given are for child, male, or female, without closer ranges of age. In addition, 53.9 per cent of all listed graves were 'quite disturbed'. Only 13 per cent were completely undisturbed, while 20 per cent were partially disturbed, and for 12 per cent, no information concerning disturbance is given. We know little more about the geological setting of Cemetery 1400-1500 than that the present nature of the soil is 'crumbly', so that graves could only have been roughly shaped, and were difficult to measure.<sup>9</sup>

### Dating

Cemetery 1400-1500 at Armant was chosen for my analysis because it is the best-recorded Predynastic cemetery, but also because its relative dating sequence was very carefully evaluated by Kaiser.<sup>10</sup> Although the excavators give ranges of (Petrie's) Sequence Dates to graves with groups of pottery, Kaiser's sequence is a much more finely graded seriation upon which a new relative chronology for the Predynastic has been based. More recently Kemp has done a multi-dimensional scaling of the pottery from two Predynastic cemeteries, using a computer program developed at the University of Cambridge. His preliminary results complement Petrie's Sequence Dating system, with the difference between his seriations and Petrie's explained by the element of stylistic judgement in the latter.<sup>11</sup>

As the Armant Predynastic settlement sites were not excavated with careful stratigraphic controls, it is impossible to place the sequence of pottery from graves into a vertical sequence. According to Kaiser's evaluation of the sequence of pottery and grave goods in Cemetery 1400-1500, three main groups of graves are discernible:

<sup>5</sup> Mond and Myers, op. cit. 163.

<sup>6</sup> Ibid. 2-3.

<sup>7</sup> Ibid. 9.

<sup>8</sup> Ibid. 9-11.

<sup>9</sup> Ibid. 9.

<sup>10</sup> W. Kaiser, *Archaeologia Geographica*, 6 (1957), 69-77.

<sup>11</sup> B. J. Kemp, *JEA* 68 (1982), 10.

1. A southern group with predominantly B-ware (Black-topped red ware).
2. A middle group with predominantly R-ware (Rough ware).
3. A northern group with predominantly L-ware (Late ware).<sup>12</sup>

These groupings are based not only on location in the cemetery and distribution of wares, but also on clusters of certain types of grave goods, shape and size of graves, and body treatment. Through the distribution of the remaining ceramic types, particularly D-ware (Decorated ware) and W-ware (Wavy-handled ware), and the evolution of vessel forms, Kaiser distinguished finer gradations within the three main groups (Table 1).<sup>13</sup>

TABLE 1. *Kaiser's Seriation of Predynastic Wares*

ra	B-ware above 70 per cent of all pottery in graves of this period	
rb	P-ware at 25 per cent	
rc	C-ware less than 5 per cent	
IIa	C-ware disappears	
	R-ware first appears	B-ware drops from 60 to
	N-ware (Nubian ware) seen	10 per cent
	mainly in this phase	R-ware increases from
IIb	D-ware and L-ware first appear	25 to 55 per cent
IIc	W-ware first appears	
IId1	B-ware drops to 5 per cent	
IId2	R-ware at 50 per cent	
	B-ware ends in II d2	
IIIa1	Great increase in L-ware to 70 per cent	
IIIa2	Decrease in R-ware to less than 20 per cent	
IIIb	Predominantly L-ware. W-ware degenerates into cylindrical jars	

Vessel forms also evolve through Kaiser's sequence. In Period I pots are mostly open beakers and bowls. Forms are more closed in Period II: there are jars and a few bottles, and the wavy-handle first appears at this time. In Period III large storage jars of predominantly L-ware are seen, and the final metamorphosis of the wavy-handled jar into a cylindrical form occurs. Kaiser's sequence was further tested in the pottery from graves at Nagada and Ballas, Mahasna, Diospolis Parva, Qau el-Kebir and Matmar, Harageh, Abusir El-Meleq, Gerza, and A-group cemeteries in Nubia.<sup>14</sup> What Kaiser seems to demonstrate is that Petrie misplaced the position of W-ware at a number of sites, putting it too early in the sequence.<sup>15</sup> This significantly affected the middle range of Petrie's Sequence Dates (SD 38-63). Where Kaiser's seriation system differs from Petrie's, then, is in his Period II. *Contra* Petrie, L-ware appears

<sup>12</sup> Kaiser, *Archaeologia Geographica* 6, 70.

<sup>13</sup> Ibid. 84-7; idem, *ZAS* 81 (1956), 107.

<sup>14</sup> Idem, *Archaeologia Geographica* 6, 73-4.

<sup>15</sup> Idem, *ZAS* 81, 92-5.

before W-ware in Kaiser's sequence. The latter also excludes Petrie's F-ware (Fancy ware) as a special class. It does not evolve in a logical sequence, but appears sporadically in Predynastic graves. At Hemamieh, excavated by Caton-Thompson, B- and P-wares were found in all levels (180-0 cm below the surface), while W-ware was found only in levels 90-45 cm below the surface,<sup>16</sup> i.e. in three of the middle to upper levels, but not in the seven lower levels or the upper two. This seems to indicate a later range for W-ware, *contra* Petrie, but in accordance with Kaiser.

Seriation systems are not equivalent to absolute dating, but Kaiser's system seems to be competent in formulating a relative sequence through which social evolution occurred. It is unfortunate that so few radiocarbon dates are available for the Predynastic, and at present the evolutionary scheme of development for Armant remains relative, without a definite time frame except in reference to Nagada radiocarbon dates. According to Hassan, radiocarbon samples from three early Nagada sites 'provide a midpoint estimate of 3760 ± 40 BC with a range of 3840-3680 BC, at a 95% confidence interval'. Dates from the Nagada II occupation in South Town, the main Predynastic occupation site at Nagada, 'provide a midpoint estimate of 3400 ± 70 BC with a range of 3600-3300 BC, at a 95% confidence interval'.<sup>17</sup>

#### Cemetery size and spatial patterns

Armant was not a major Predynastic centre like Nagada and Ballas, where an estimated 3,000 graves were excavated. Graves in areas 1200, 1300, and 1400-1500 at Armant number 235 individuals at the most, if unrecorded graves in the numbering system are also included. It is possible that a few Predynastic graves were missed by the excavators, which might bring the total to 250 burials in the known Predynastic cemeteries. This could be doubled if the missing cemetery for the excavated occupation site in area 1000 is included. A total of 500 Predynastic burials for Armant is a generous estimate, but still small in comparison to the Nagada and Ballas cemeteries. The main Predynastic cemetery at Nagada had over 2,000 known graves and is 870 × 200 m, whereas Armant Cemetery 1400-1500 numbered around 200 graves and is 170 × 75 m.

In its internal spatial arrangement, Cemetery 1400-1500 seems to have a recognizable pattern. Graves of Ic and IIa are small ovals clustered closely together in the southern part of the cemetery. This pattern changes in IIb, when larger rectangular graves are distributed further to the north, in less dense concentrations, while smaller IIb oval graves tend to be more closely spaced among those of Ic and IIa. With a shift in grave size to proportionately larger ones in IIc (Table 2), there is a northward movement in the cemetery, and graves are widely spaced. In IIId1 and IIId2 the graves are further north still, and very widely scattered. Finally, in IIIa1 and IIIa2 graves are clustered exclusively in an area at the far north of the cemetery.

<sup>16</sup> Guy Brunton and Gertrude Caton-Thompson, *The Badarian Civilization* (London, 1928), 79.

<sup>17</sup> Fekri A. Hassan, *Current Anthropology*, 22:5 (1984), 683.

TABLE 2. *Mean Grave Size (sq. m) of Dated Graves (with standard deviations)*

Phase	No. of graves	Size (st. d.)
Ic	18	0.77 (0.38)
IIa	17	0.95 (0.61)
IIb	23	1.20 (0.45)
IIc	27	1.84 (0.90)
IIId	24	1.94 (0.71)
IIIa	11	1.96 (0.51)

#### Description of graves

Although there are several instances of multiple burials in single graves in Cemetery 1400-1500 at Armant, no intrusive burials are suggested in the recorded evidence. Perhaps the burials were once marked on the surface, for the horizontal spread of graves through time seems to be purposeful. Cemetery 1400-1500 was probably a village cemetery physically set apart, and accorded respect through Predynastic times. Apart from grave robbing, no other disturbances are evident, perhaps because occupation of the unexcavated village near this cemetery ceased in dynastic times.

The 'earlier tombs lower down the spur' are described by the excavators as 'rough ovals, generally'.<sup>18</sup> For the above table, grave size was calculated by rectangular floor size, i.e. length times width. For the earlier graves (Kaiser's Ic-IIa), which were assumed to be mostly ovals, 10 per cent was subtracted from the grave size to account for the slightly smaller area of ovals than rectangles. Cubic dimensions of grave pits have not been calculated, as surface changes from the Predynastic to the present were not noted by the excavators.

The great majority of graves were simple pits for flexed burials. Information on grave linings is given for only 31 per cent of the graves, and it must be assumed that the rest had no trace of linings. Matting was sometimes found over and/or under the skeleton, or around the sides of the grave pits. In a few instances linen covered burials instead of matting. Several graves had traces of wood, either as a grave lining or a coffin, and two graves (1466, 1511) contained a wooden bed. Five graves had loculi cut next to the burial pit, presumably for additional space for grave goods.<sup>19</sup>

Only 41 per cent of the body attitudes are given for the burials, and many of these incompletely. Body attitudes were coded by Mond and Myers using Brunton's system developed for *Qau and Badari*.<sup>20</sup> All Predynastic burials at Armant in which

<sup>18</sup> Mond and Myers, *op. cit.* 9.

<sup>19</sup> *Ibid.* 26-31.

<sup>20</sup> Guy Brunton, *Qau and Badari I* (London, 1927), 49-50.

the body attitudes are listed were flexed. The excavators were more careful in recording orientations of the burials, in terms of azimuth angles, and 82 per cent of the burials have listed orientations. Of the burials with given orientations, 62.8 per cent had the head to the south-west ( $180^{\circ}$ - $270^{\circ}$  to due north), 23.1 per cent were oriented to the north-west, 11.5 per cent to the south-east, and the remaining 2.4 per cent to the north-east. Body orientation with head pointing to the south to south-west was thus by far the most common.

#### Description of grave goods

Pottery was the most common type of grave goods found in the Predynastic burials at Armant. Even the poorest burials which contained no other artefact, usually included one or two pots. Presumably these once contained foodstuffs or other organic goods as offerings for the deceased, but no trace of these was noted by the excavators. At Nagada an R-ware bowl from a grave excavated by Hassan was found to contain barley seeds, and Needler suggests that B-ware beakers were probably originally used in the household for serving drink and perhaps food.<sup>21</sup> Vessels with small mouths were probably for food storage, and some jars may have been for water.

Palettes were found in graves from all of Kaiser's periods and in two Terminal Predynastic graves, as well. The earliest palettes at Armant from Ic are shaped as either half-circles or rhombs, with two amorphous animal heads or horns at the top. Fish- and turtle-shaped palettes appear in Kaiser's Period II. Circular and rectangular examples were found in a Terminal Predynastic grave at Armant (1312), corresponding to Kaiser's IIb. Palettes were more common at Armant in Periods Ic and IIa, but this could be due to the fact that the earlier graves were much less disturbed than the later ones.

Rubbing stones were sometimes found with the palettes in the Predynastic graves at Armant, and pigments for cosmetics, such as galena, malachite, and red ochre, were placed in some of the graves. Chipped stone tools, such as points, flakes, and blades, and cores from tool manufacture, were found in some of the Predynastic graves. Fish-tail projectile points were found in two graves (1457, 1523) dating to Kaiser's Periods Ic and IIc. A ripple-flaked knife was in grave 1573, from Period II d2. Other stone artefacts in graves included polishing- and grinding-stones, and a hammer-stone.<sup>22</sup> A few stone vessels were excavated in the cemeteries at Armant, but these were not found in any great quantities until the Terminal Predynastic. A footed lug-handled vessel was in grave 1466, dated by Kaiser to IIa, while a more squat lug-handled jar with a flat bottom was in a grave of IIc (1550).

Next to pottery, beads were the most common grave goods. Other jewelry included bracelets or armlets, and a ring in grave 1554.<sup>23</sup> A number of other craft goods were found, including carved combs, tag-like objects, and points. A carved 'gaming set' with two stone balls was found in grave 1572. Two stone hippopotami

<sup>21</sup> Winifred Needler, *Predynastic and Archaic Egypt in the Brooklyn Museum* (Brooklyn, 1984), 171.

<sup>22</sup> Mond and Myers, op. cit. 26-32.

<sup>23</sup> Ibid. 30-1.

were in grave 1451, and three clay 'hands' were found in grave 1542. Baskets occurred in several graves, and sheets of linen were found in five graves, over or under the body.<sup>24</sup> Craft goods were made in a wide variety of materials. Palettes were carved from slate, and ivory was used for a carved vessel, ring, combs, points, the tag-like objects, and a gaming set.

Shell was made into bracelets, and whole shells, both riverine and marine (Red Sea), were found in a number of burials. Ostrich egg shell was used for beads. Materials for beads varied, from one bead of lapis lazuli in grave 1567 to fired clay. Steatite beads were the most common, but carnelian was also frequent. Stones from the Eastern and Western Deserts, such as chalcedony, quartz, and garnet, were also used for beads, as were faience and imported materials, such as malachite, amber, bitumen, resin, and Red Sea coral.<sup>25</sup>

Various organic remains were recorded. Animal bones of several species, from gazelle to jerboa, were listed by the excavators, and animal skins were sometimes found over the human remains. Feathers were found in one grave (1492), and resin or gum was sometimes noted.

On the whole, the burials in Cemetery 1400-1500 were relatively poor in craft goods, apart from pottery and beads. Copper occurred in only one grave (1547), in two bracelets.<sup>26</sup> Whether this paucity of craft goods is a result of grave robbing is impossible to determine.

#### Analyses of the Predynastic graves

Although a high percentage of burials at Armant had been disturbed, very few were completely devoid of grave goods. As pottery was the most common type of grave goods, analysis of the dated graves began with it. The intent of the Armant analyses was to determine grave differentiation and changes in this through time. Although total quantity of grave goods would be the first logical choice for analysis, this could not be used as a criterion because of the substantial grave robbing at Armant.

Instead of using Kaiser's more finely divided time periods, four basic periods were created (Ic; IIa and b; IIc, II d1, and II d2; IIIa1 and IIIa2), in order to distinguish broader changes through time. Tables 3 and 4 summarize the pottery analyses.

The major trend for pottery throughout Kaiser's Predynastic periods is towards an increasing mean number of pots per grave. The major change in wares throughout the Predynastic sequence is from predominantly B-ware in Ic to L-ware as the most common ware in IIIa.

In addition to the increasing number of pots per grave, another measure of differentiation would be by other grave goods. If all burials were undisturbed, the number of goods and their values (in precious to common materials) could be analysed. The presence or absence of rare materials in graves might be a valid basis for differentiation.

The first step in the analysis of grave goods other than pottery was to study the

<sup>24</sup> Ibid. 27-31.

<sup>25</sup> Ibid. 101-9.

<sup>26</sup> Ibid. 30-1.

TABLE 3. Mean Number of Pots in Dated Graves

Phase	No. of graves	No. of pots per grave	Mean (st. d.)
Ic	28	0-4	1.38 (1.20)
IIa-b	56	1-16	3.60 (2.47)
IIc-d	53	1-20	5.27 (3.55)
IIIa	12	1-17	8.18 (5.17)

TABLE 4. Ware Percentages for Dated Graves

Phase	No. of pots	C (%)	B (%)	P (%)	R (%)	D (%)	W (%)	L (%)
Ic	36	2.70	70.27	24.32	0.00	0.00	0.00	0.00
IIa-b	193	0.00	41.79	13.06	40.30	2.61	0.00	1.50
IIc-d	270	0.00	8.36	20.04	57.11	4.27	7.77	1.62
III	110	0.00	0.00	15.19	25.82	2.37	5.31	50.92

quantities of materials in individual graves, but this approach was not successful given that graves at Armant were often disturbed. The graves were next analysed in terms of characterization of types of materials present, because grave robbers were rarely successful in clearing graves of all goods. Frequencies were run on sixty-five different materials present in Predynastic graves (both dated and undated) at Armant, and five groups (here called 'New Material') were established. Table 5 lists the results.

In establishing the list of New Materials, the fourteen remaining materials from Armant burials were given a value of 0, as these were either too indefinitely labelled by the excavators (such as skin, tooth), or were common local materials (fired clay, goat bones).

Cross-tabulations were then calculated on the New Material groups by grave number. The results showed that most of the graves with New Material 1 also contained grave goods of several other New Material groups. The distribution of rare materials in all Predynastic graves was sporadic, however, and did not necessarily correspond with what could be considered the richest graves. This phenomenon can be accounted for by the random and widespread occurrence of grave robbing. Percentages of dated graves with New Materials 1-5 by time period were also calculated (Table 6).

If anything, this table demonstrates higher percentages for all New Materials in Period Ic, and not a trend to richer graves in the later periods, as might be expected.

TABLE 5. Frequencies of Materials of Grave Goods by New Material Group

Group 1	Materials which occurred one to two times: amber, black resin, breccia, brecciated marble, chalcedony, galena, lapis lazuli, <i>Mutela dubia</i> (Nilotic shell), porcelaine, quartz, quartzite, red ochre, rose quartz, sard (dark carnelian), <i>Spatha rubens</i> (Nilotic shell).
Group 2	Materials which occurred three to five times: basalt, calcite, <i>Clanculus pharaonis</i> (Red Sea shell), crystal quartz, diorite, gesso, <i>Natica mamilla</i> (Red Sea shell), ostrich egg shell, resin, veined marble, volcanic ash, wood opal.
Group 3	Materials which occurred six to ten times: agate, beetle femora ( <i>Sterapis squamosa</i> ), bitumin, copper, fluorspar, garnet, gypsum, ivory, linen, malachite, <i>Nerita polita</i> (Red Sea shell).
Group 4	Materials which occurred eleven to twenty times: flint, limestone, <i>Pythma</i> (Red Sea shell), serpentine, slate, steatite.
Group 5	Materials which occurred twenty-one plus times: alabaster, carnelian, coral ( <i>Tubipora musica</i> ), faience, fossil shell, shell.

TABLE 6. Percentages of Dated Graves with New Materials

Phase	No. of graves	NM 1 (%)	NM 2 (%)	NM 3 (%)	NM 4 (%)	NM 5 (%)
Ic	28	10.71	14.28	10.71	21.42	35.71
Total		6	6	3	9	14
IIa-b	56	10.71	14.29	8.93	14.29	10.71
Total		8	15	7	17	6
IIc-d	53	9.62	7.69	11.54	9.62	23.08
Total		5	4	1	7	18
IIIa	12	8.33	8.33	8.33	8.33	8.33
Total		1	3	1	1	1

Again, these percentages might be affected by grave robbing, as the excavators recorded a proportionately higher number of undisturbed burials among the earliest graves. Means of New Materials in dated graves were also calculated (Table 7), but seem distorted as well.

As neither an analysis of pots per grave, nor New Material percentages and means, clearly determined patterns of grave differentiation in the dated Predynastic graves, the data were submitted to cluster analysis. Cluster analyses fall into two broad categories. Agglomerative methods begin by forming individual cases into clusters and then adding the most closely related groups or cases until all cases form one large cluster. Divisive methods, on the other hand, begin with one large cluster and subsequently divide cases into smaller and smaller clusters. The latter method was deemed most appropriate for the dated Predynastic graves in Cemetery 1400-1500 because it could be run a number of times until the optimum number of clusters was reached (with characteristically different groupings, but not infinitely large or small

divisions). Specifically, the BMDP K-means clustering technique appeared to offer an excellent means of testing the hypothesis of grave differentiation at Armant and changes in this through time.

TABLE 7. Means of New Materials 1-5 by Period

Phase	No. of graves	NM 1 (st. d.)	NM 2 (st. d.)	NM 3 (st. d.)	NM 4 (st. d.)	NM 5 (st. d.)
Ia	28	0.21 (0.67)	0.21 (0.67)	0.10 (0.10)	0.32 (0.66)	0.50 (0.87)
Ila-b	56	0.14 (0.44)	0.27 (0.83)	0.13 (0.43)	0.30 (1.05)	0.11 (0.31)
Iic-d	53	0.09 (0.29)	0.07 (0.83)	0.20 (0.43)	0.13 (0.44)	0.34 (0.78)
IIIa	12	0.08 (0.28)	0.25 (0.83)	0.08 (0.28)	0.08 (0.28)	0.08 (0.28)

The BMDP K-means cluster analysis with Euclidian distance<sup>27</sup> was chosen for several reasons. Unlike most cluster analyses, the BMDP K-means can be used on cases with missing values in the variables, which is a problem with the Armant graves, although they are fairly well recorded. In addition, the divisive method seemed better than the agglomerative one:

Divisive methods are free from the following difficulty that may often arise with agglomerative methods: in the latter the combining process is begun with the smallest units (the quadrants themselves) and these are the ones in which chance anomalies are most likely to obscure the true affinities. The result is that bad combinations may be made at an early stage in the agglomerative process and they will affect all subsequent combinations.<sup>28</sup>

Selection of variables was an important consideration, as too many variables or the wrong ones could affect the type of cluster formation. Those chosen were:

1. Total number of undecorated pots (B-, P-, R-, and L-wares).
2. Total number of decorated pots (C- and D-wares).
3. Total number of W-ware.
4. Grave size.
5. New Materials (for Period Ic only).

New Materials were recalculated for those appearing only in Period Ic, where the Armant graves were the least disturbed and rare materials of grave goods would be found (Table 8). For graves of all other periods, which were highly disturbed, New Materials were not included in the cluster analysis.

As both the means of pots and the means of grave size increased through the time

<sup>27</sup> W. J. Dixon (ed.), *BMDP Statistical Software* (Berkeley, 1981).

<sup>28</sup> E. C. Pielou, *Mathematical Ecology* (New York, 1974), 316.

periods, these changes were thought to be significant variables for grave differentiation. Pots were also chosen for variables in the cluster analysis because they were grave goods which had not been stolen. For the cluster analysis, pots were divided into three categories, as decorated pots were rarer (and therefore probably more valued) than undecorated pots, and W-ware, with its origins as an import, was likely to have been considered of high status. A more specific itemization of wares was not used in the cluster analysis because these variables had already been used to form the groups of relative time periods. Palettes were not chosen as a variable because their mean number drops significantly through time (0.38 in Period Ic, to 0.06 in Period IIIa). This suggests that palettes were stolen with other valued goods in the highly disturbed later graves. Palettes as a variable in graves of Period Ic, which were least disturbed, are included as a New Material (3) variable.

TABLE 8. New Materials for Period Ic Graves

Group 1	Materials which occurred one to two times: agate, amber, carnelian, crystal quartz, faience, ivory, ostrich egg shell, sard.
Group 2	Materials which occurred three times: malachite, steatite.
Group 3	Materials which occurred seven times: slate.

Cluster analysis was done using the time periods from the previous analyses: Ic, Ila-b, Iic-d, and IIIa. Using this method on four period groups offered an opportunity to view changes in grave differentiation through time. Data for the BMDP K-means cluster analysis on the Armant graves underwent  $\text{Log}_{10}$  transformation prior to analysis. This transformation gave less weight to actual numbers and emphasized differences in the relationship among goods between graves. Without the  $\text{Log}_{10}$  transformation, the data would be swamped by wide ranges of values, giving a large weight to cases with the highest numbers. The  $\text{Log}_{10}$  transformation keeps relative distances between the values, but reduces the values to a scale of comparable ranges. K-means clustering begins with all the graves in one cluster. It then divides it into two clusters, and so on, until the predetermined number of clusters is reached. In each iteration of this procedure, a statistical centre is created and graves are allocated to the cluster whose centre is closest.

For each time period, two and four clusters were allotted to the data. With the exception of Period Iic-d, four proved to be too many, as some clusters formed with only one grave. For Periods Ic, Ila-b, and IIIa, cluster formation showed that two were the appropriate allotment for the data. For Period Iic-d, where the data are more complex, four were the appropriate allotment. Clusters formed for the dated Armant graves are listed with the variable means in Tables 9 and 10.

In Periods Ic and Ila-b there is a clear division in the clusters between a smaller number of graves with larger grave pits and higher means of undecorated wares, and a larger number of graves with lower means of these variables. The variation in

TABLE 9. Means of Grave Size (sq. m) and Wares in Clusters

Date	CL	No. of graves	(st. d.)	Undec. wares (st. d.)	Dec. wares (st. d.)	W-ware (st. d.)
Ic	1	8	1.15 (1.67)	2.87 (0.78)	0.00 (—)	0.00 (—)
Ic	2	19	0.80 (0.26)	0.65 (0.48)	0.06 (0.22)	0.00 (—)
IIa-b	1	20	1.27 (0.60)	6.25 (2.38)	0.20 (0.40)	0.00 (—)
IIa-b	2	36	1.10 (0.53)	1.80 (0.75)	0.09 (0.28)	0.00 (—)
IIc-d	1	5	2.93 (1.00)	12.00 (2.68)	0.60 (0.80)	1.20 (1.66)
IIc-d	2	15	1.30 (0.44)	4.20 (1.72)	0.20 (0.40)	0.27 (0.57)
IIc-d	3	16	1.70 (0.65)	1.38 (0.60)	0.19 (0.39)	0.13 (0.33)
IIc-d	4	17	2.27 (0.56)	5.88 (1.37)	0.18 (0.38)	0.59 (0.84)
IIIa	1	8	2.00 (0.39)	10.50 (3.94)	0.25 (0.43)	0.50 (0.71)
IIIa	2	4	1.44 (0.35)	2.70 (1.90)	0.00 (—)	0.00 (—)

TABLE 10. Means of New Materials 1-3 for Clusters of Period Ic

CL	No. of graves	NM 1 (st. d.)	NM 2 (st. d.)	NM 3 (st. d.)
1	8	0.50 (1.32)	0.25 (0.66)	0.25 (0.43)
2	19	0.40 (1.11)	0.20 (0.51)	0.30 (0.46)

means of grave size is slight, however, with the means being close to 1 sq. m. The close size of grave pits is probably due to the relatively small number of grave goods found in early graves and the fact that 1 sq. m in an oval dimension is close to the minimum size for a flexed burial of an adult. Means of undecorated wares are higher in Cluster 1 of both Periods Ic and IIa-b, with a considerable increase in the mean number of undecorated ware (6.25) in Cluster 1 for Period IIa-b. W-ware is not found in these two periods, and C-ware (the decorated ware for Period Ic) is only found in very low proportions (in Cluster 2). In Period IIa-b, when D-ware is introduced, Cluster 1 has a higher mean number of decorated pottery than Cluster 2.

In terms of higher means (grave size, undecorated wares), Clusters 1 for Periods Ic and IIa-b, with significantly smaller numbers of graves than in Clusters 2, are dimensionally richer.

Means of New Materials 1-2 in the mostly undisturbed graves of Period Ic are also slightly higher for Cluster 1. Cluster means of New Material 3 (slate, i.e. palettes) are close, but demonstrate that graves in Cluster 2 have a few more palettes than graves in Cluster 1.

In Period IIc-d, when grave size shifts to proportionately larger ones, the clustering of graves is more complex. One cluster was formed with five graves which have significantly higher means of undecorated pots (12.0) and W-ware (1.2), and a somewhat higher mean for decorated ware as well as the largest mean grave size (2.93 sq. m). The other three clusters, which are larger in number (15, 16, 17) have considerably lower means of all wares. Cluster 4, with the second highest means of undecorated wares and W-ware, also has the second largest mean grave size (2.27 sq. m). Basically in Period IIc-d, grave clusters are differentiated between a small number of graves with large grave pits, a high mean number of undecorated wares, and the highest mean for W-ware (Cluster 1); graves with smaller grave pits and gradually decreasing means of all wares (Clusters 2 and 3); and a third group (Cluster 4) intermediate between these two.

Like the earlier graves, graves in Period IIIa formed two clusters. Cluster 1 has much higher means of grave size and undecorated wares. Decorated ware and W-ware are found only in Cluster 1. Unlike the earlier groups, a larger number of graves (eight) is in the richer Cluster 1, than in Cluster 2 (four graves). This division of graves where there are more rich ones than poorer ones, in terms of grave size and numbers of grave goods, is perhaps due to the small size of the sample (twelve). The small number of late graves in Cemetery 1400-1500 suggests that by Period III poorer graves were located elsewhere, as use of this cemetery area ceased. Possibly late burials continued in the nearby area 1300, where several Terminal Predynastic graves were excavated close to the present-day edge of cultivation.

To summarize, quantitative analyses for the Predynastic graves at Armant show a trend to greater numbers of pots and larger grave pits in the Period IIc-d graves. With the possible exception of graves from Period IIc-d, cluster analysis of grave goods does not show a great deal of differentiation except into two basic hierarchies (of poorer and richer graves, based on numbers of wares and relative grave size). Graves in Period IIc-d are differentiated into a greater hierarchy of clusters, the richest (and smallest) cluster showing high means of undecorated wares and W-ware, and a large grave size. While cluster analysis is basically a descriptive technique which can only demonstrate general patterns, factors other than types and quantities of grave goods may also provide criteria for hierarchies, and these factors may also have changed through time. The incomplete nature of the data base, a problem with any archeological sample, no doubt affected the quantitative results, but a lack of any overall, complex hierarchy of grave differentiation in Cemetery 1400-1500 seems to be the predominant implication of these analyses.

### Interpretation of the Armant analyses

Although most of the Predynastic graves in Cemetery 1400-1500 were disturbed to some degree, thereby making variables for a quantitative analysis incomplete, mortuary evidence does suggest a ranked society there, beginning with the earliest graves. The largest recorded grave (2.09 sq. m), dating to Kaiser's Period Ic, is that of a child (1461). Though highly disturbed, this is five times the size of the smallest grave of this period, 1459 (0.4 sq. m), an undisturbed grave of an (adult) female. In accord with its status, grave 1461 also contained five artefacts in New Material groups 1, 2, and 4. This child's burial is also larger than the largest for an adult male (1435A, 1.2 sq. m), and only one other grave of this period (1424, male) has more artefacts in New Material groups. While evidence is lacking for a pyramid of age and sex types of burials, a child's grave with greater energy expenditure in terms of facility and associated artefacts suggests the existence of a ranked society. According to Brown, 'as the hierarchical aspects of society increase, children will be accorded relatively more elaborate attention in proportion to the decline in the opportunity for replacement of the following generation'.<sup>29</sup> Brown cautions, however, that grave wealth in child burials must be interpreted with reservations since inherited prestige of ranked lineages can be symbolized by this means as much as inherited authority of more ranked societies.<sup>30</sup>

Two inscribed ivory tags, commonly found at Nagada but in no other graves at Armant, also occurred in grave 1461, perhaps as a badge of status. The presence of symbols of authority in infant and adult graves alike constitute strong evidence for inherited status.<sup>31</sup> Evidence, then, from Period Ic suggests status and wealth ascribed from birth and not achieved through life, a characteristic of a non-egalitarian ranked society.

Symbols of rank and office occur when the sphere of authority widens and power gravitates towards individuals, with leadership superseding other statuses and dominating the mortuary symbolism.<sup>32</sup> Only two burials (both males) in Cemetery 1400-1500 were on beds (1466, 1511), possible symbols of (village) authority. Bed burials are not known for the Nubian A-Group,<sup>33</sup> contemporary with the Egyptian Predynastic, but a possible parallel for the high status of the Armant bed burials is found much later at Kerma. Three mud-brick tumuli, contemporary with the Egyptian Seventeenth Dynasty, contained the burials of Nubian kings on beds, surrounded by personal effects and pottery.<sup>34</sup>

Undoubtedly, the most sumptuary Predynastic burial at Armant was grave 1466, a partially disturbed burial of a male on a wooden bed, with nine pots, slate palette, gypsum vessel, gazelle skull, and three painted gesso objects (unique to Armant). The term 'sumptuary', as defined by Levy,<sup>35</sup> refers here to social rules that limit

<sup>29</sup> James A. Brown, *The Archaeology of Death* (Cambridge, 1981), 27.

<sup>30</sup> *Ibid.* 29.

<sup>31</sup> *Ibid.* 29.

<sup>32</sup> *Ibid.* 28-9.

<sup>33</sup> C. M. Firth, *Archaeological Survey of Nubia. Report for 1908-1909, Vol. 1* (Cairo, 1912); and Hans-Ake Nordstrom, *Neolithic and A-Group Sites* (Stockholm, 1972).

<sup>34</sup> Kemp, in *Ancient Egypt. A Social History* (Cambridge, 1983), 164-6.

<sup>35</sup> Janet E. Levy, *Journal of Field Archaeology*, 6 (1979), 51.

access to specialized artefacts to certain members within a society. According to Levy, 'sumptuary goods are those special objects which denote differences of rank, authority, and/or occupation'.<sup>36</sup> Grave 1466 also contained nineteen artefacts in New Materials 1, 2, 3, and 5, and was one of the largest graves of Period IIa-b. The other bed burial in Cemetery 1400-1500, 1511, dating to Period IIc, was less elaborate in terms of burial goods, but is also of a male. According to the excavators, grave 1511 was only partially disturbed. It measures 1.8 sq. m in floor size, slightly below the mean grave size for this period. Perhaps in these two bed burials there is evidence for symbolized authority and power in a society which is ranked.

Another expectation of Brown's confirmed in the Armant Predynastic burials is that 'as authority increases the amount of wealth and effort expended on burial will increase'.<sup>37</sup> As the later graves at Armant were much more disturbed than the earlier ones, craft goods discovered in graves actually decreased through time. There were fewer grave goods of New Materials in the later graves than in the earlier ones. The mean number of pots in graves increased from 1.38 in Period Ic to 9.17 in Period III, however, an indication of greater effort expended on the later burials, given their state of disturbance. Not only does the mean number of pots per grave and the mean grave size (effort expended on burial) increase significantly through time, but differences in these variables within each period become more pronounced. Burials in Period Ic contained 0 (five burials) to 4 (1402) pots, whereas burials in IIc and IIc contained 1 (six burials) to 20 (1511) pots, demonstrating a much greater differentiation of goods accompanying the burial. Grave size in IIc and IIc varies from 0.66 sq. m (1469) to 3.54 sq. m (1466), whereas grave size variation in Ic has a much smaller range (1452, 0.48 sq. m; 1461, 2.09 sq. m). With greater effort expended on the later graves at Armant, as evidenced in the pottery and grave size, the inference according to Brown's criterion is that there was a corresponding increase in authority in the Predynastic society at Armant. Through time, grave size increased much more for the high status burials than for the low status ones.

Cluster analysis of the dated burials at Armant was thought to be the best method for differentiating the burials in terms of hierarchies of grave goods. The clusters clearly distinguish two groups of richer and poorer graves in the earlier (Ic, IIa-b) and later (III) periods. In Period IIc-d, there is a greater complexity of clustering of grave types, but basically this clustering is between a small number of graves (Cluster 1) with large pits and high means of undecorated and W-ware, and graves (Clusters 2, 3, 4) with smaller pits and decreasing means of all wares. This seems to indicate a two-tiered, or ranked society, throughout the Predynastic periods at Armant, which does not change appreciably.

Social differentiation, in terms of burial goods, does not vary through time because the society represented by Cemetery 1400-1500 was probably no more than a farming village without an increasing number of internal hierarchies. Instead, there seems to be a continuum of relatively richer and poorer groups throughout all the Predynastic periods at Armant. Complex social hierarchies which can be

<sup>36</sup> *Ibid.* 51.

<sup>37</sup> Brown, *op. cit.* 29.

demonstrated in burials from societies organized into complex chiefdoms are not evident. Burial goods indicate a limited resource base of a small farming village. Exotic imported materials and elaborate craft goods are not very much in evidence, possibly because there was not a highly differentiated élite (in an increasingly stratified society) requiring high status goods.

It is unlikely that Armant was a major centre of exchange of exotic goods and materials in Predynastic Egypt. Compared to Nagada, its cemetery is small. Centralization forces and accompanying social stratification would not be expected to have occurred significantly at Armant. An élite class of society would have emerged at large centres like Nagada, not in small farming villages such as Armant. Possible symbolic 'badges' of status are scarce (two bed burials, and a child burial with tag-like objects).

Mortuary differentiation by age and sex, which should be discernible in the symbolic treatment of burials of both simple and complex societies, was problematic at Armant. Because of insufficient data, a discriminant analysis of differences in grave goods according to the age/sex of dated burials did not demonstrate any results, and a sociocultural model for grave types based on age/sex is not possible.

The spatial distribution of the graves in Cemetery 1400-1500 shows the later graves in the northern part of the cemetery and the earliest graves in the south closer to the edge of cultivation. In a study based on evidence from thirty societies, Tainter found that 'the presence of formal disposal areas will strongly indicate that the archaeologist has isolated individual corporate groups' practising lineal descent.<sup>38</sup> The corporate group at Cemetery 1400-1500 was not differentiated spatially, however, except in terms of a general northward movement through time. Brown's criterion, that 'as power increases the attachment of the powerful exclusively to locations indicative of their power base will emerge' in the mortuary ritual,<sup>39</sup> is not seen in the undifferentiated spatial distribution of graves at Armant.

The biggest change at Armant in terms of the whole complex of variables for social differentiation is seen in the two large brick-lined tombs (1207 and 1208), i.e. the introduction of an unusual grave facility. Both of these tombs contained large numbers of stone vessels in New Materials, and date to the Terminal Predynastic, Dynasty 0 (Petrie's SD 79-81). It is significant, too, that tombs 1207 and 1208 are set spatially apart from Cemetery 1400-1500. As there is nothing in the development of grave types in the cemetery (1400-1500) which anticipates 1207 and 1208, a reasonable hypothesis is that these tomb types developed elsewhere and were introduced by forces outside the existing social order at Armant. Possibly the Terminal Predynastic was a relatively short period of time, given that there are so few graves of this period at Armant compared to those of Periods I and II.

Another possibility is that Cemetery 1400-1500 was being abandoned and graves of Period III at Armant were located elsewhere, and are now destroyed. Hassan indicates a settlement shift in Nagada III times at Nagada from the low desert to

<sup>38</sup> Joseph A. Tainter, *For Theory Building in Archeology* (New York, 1977), 123.

<sup>39</sup> Brown, *op. cit.* 29.

the floodplain, coinciding with the onset of a new period of desiccation and lower Nile floods, and he speculates that Nagada III graves were also to be found on the floodplain, closer to the new settlements (personal communication).

Although tombs 1207 and 1208 at Armant are smaller than Morgan's 'royal' tomb at Nagada or tomb 3471 at Saqqâra,<sup>40</sup> and without elaborately niched superstructures, they are none the less very different from other graves at Armant. Emery identifies the Nagada 'royal' tomb as that of Neithotep, the mother of Horaha,<sup>41</sup> the first king of the First Dynasty, and tomb 3471 dates to the reign of Djer, who succeeded Hor-aha. Thus, what tombs 1207 and 1208 at Armant probably reflect is the imposition of royal order by the administrative hierarchy of the kings who unified Egypt at the end of the Predynastic period, and not the development of a local ruling hierarchy.

Social stratification in terms of mortuary ritual cannot be seen at Armant, although the society was differentiated into two levels from the times of the earliest Predynastic burials there, in phase Ic. Mortuary ritual did become increasingly elaborate through time (larger graves, more grave goods), but further stratification is not attested, nor would one expect this within the village society that Cemetery 1400-1500 represents. There were figures of authority, as symbolized in the bed burials of graves 1466 and 1511, but no élite until tombs 1207 and 1208 appeared in the Terminal Predynastic.

<sup>40</sup> W. B. Emery, *Archaic Egypt* (Baltimore, 1967), 48, 64.

<sup>41</sup> *Ibid.* 53.