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Paleogenetics of the Late Roman-Early Byzantine Cemeteries at Sayala, Egyptian Nubia

Out of the five late Roman-early Byzantine cemeteries at Sayala, the three large burial complexes CI-III were found to represent the same population not only on the basis of 76.6% of the metric features already studied, but also of 72.9% of the 48 non-metric features examined in the present paper. The remaining features, which show different frequencies, were most probably related to some social and/or genetic isolation of the three subgroups ("lineages") of the same basic population.

The left-right asymmetry of the frequencies was practically irrelevant; sex differences were however present in one-third of the features observed.

Some of the traits showed unusually high frequencies, revealing a high rate of inbreeding within a homogeneous population.

To evaluate the relationships among the CI-III people and the neighbouring populations, 22 discrete traits were compared with the same traits studied in 11 Ancient Egyptian samples by Berry, Berry & Ucko (1967) and in 6 contemporary African Negro samples by Rightmire (1972). It was shown that the Sayala CI-III population does not resemble either of these groups. The fourth contemporary Sayala sample from A cemetery was also found to be not related with the CI-III sample on the basis of the same traits. The fifth contemporary Sayala sample from N cemetery was too small to be tested. Moreover, the comparison between the CI-III population and the C-group population of Sayala also revealed the lack of genetic continuity. The isolated position found in the CI-III population of Sayala agrees with the hypothesis that it would represent the Blemmyes, people originating from the Eastern Desert.

1. Introduction

At Sayala, 130 km south of Aswan in Egyptian Nubia, five contemporary cemeteries dated to the 4th-5th centuries A.D. were investigated by the Austrian expedition during the International Campaign of Saving and Guarding Nubian Monuments in 1961-65 (Strouhal & Jungwirth, 1971). The tombs of the A cemetery, which yielded the remains of 24 individuals, were simple burials in crevices, except for one four-chambered stone-built tomb, all scattered among the older tombs of a C-group cemetery. On the same eastern bank of the Nile, some 600-800 m to the south, large collective burial complexes CI-III were built from unworked stones. They were the result of gradual growth from the center to the periphery, attaining very large dimensions. The CI-III burial complexes contained the remains of 65, 139 and 167 individuals, respectively. Another cemetery (N) was detected on the opposite western bank of the Nile, consisting of simple pit tombs, often containing multiple burials. It was only partially excavated, yielding the remains of 56 individuals.

2. Materials and Methods

While the east bank cemetery A and the burial complexes CI-III were reserved almost entirely for adults with older children aged 10 years or more, and showed a predominance of males over females, the west bank cemetery N was demographically "normal" (Strouhal, 1979). These differences are clearly reflected in the average age at death of their occupants: 28.7 years at A cemetery; 31.4 years at CI cemetery; 32.2 years at CIII

cemetery, and 32.8 years at CII cemetery. On the other hand, the N cemetery is characterized by an average age at death of 16.4 years only, due to the predominance of children up to 13 years (62.5%) over juveniles and adults.

The general morphology of the skeletal remains, expressed in classical racial terms, showed a somewhat different picture. The results of the physical anthropological study pointed to the prevalence of the Europoid type (84.5%) in the burial complexes CI–III as well in the N cemetery, with a small share of mixed (11.4%) and Negroid (4.1%) types. On the other hand, people buried in the A cemetery were mostly of an intermediate morphology (57.1%) with more Europoids (33.3%) than Negroids (9.6%).

For the study of the mutual relationships among the five cemeteries, however, different modern approaches can be used. By means of the metric features, submitted to the variance analysis, the three burial complexes CI–III showed 76.6% identical values, with 10.3% statistically significant differences at the 0.05 probability level, and 13.1 significant differences at the 0.01 probability level. This would suggest their morphological proximity.

To test the hypothesis whether the people buried in these three burial complexes were drawn from the same basic population, 48 non-metric features of supposedly genetic background (33 cranial and dental, and 15 postcranial) were chosen. The distribution of their modality frequencies were submitted to the χ^2 test.

3. Results and Discussion

Cranial and dental features were to be found identically distributed in the same percentage in both males and females in 72.7%. In males 12.1% of the features observed were significantly different at the 0.05% probability level, and 15.2% at the 0.01% level. In females 21.2% and 6.1% of the features were significantly different ($P = 0.05$ and 0.01 respectively). In the postcranial features, however, the male subsamples were found less close, showing 66.6% of identical distributions only, with 13.3% ($P = 0.05$) and 20.0% ($P = 0.01$) of significantly different features. On the other hand, female subsamples showed closer resemblance (80% of identical features and 20% of significantly different features only, all at the 0.01% probability level). Summing up both sexes and both kinds (cranial and postcranial) of epigenetic characters, the occupants of the three burial complexes were found identical in 72.9% of the features considered and significantly different in 13.5% ($P = 0.05$) and 13.5% ($P = 0.01$).

We may conclude that both metric and epigenetic characters seem to point to the provenience of the three samples from the same basic population with some differences, probably due to the nature of three contemporary, more or less socially isolated inbreeding entities, which could be termed "lineages".

In 18 of the above non-metric features the left-right asymmetry could be studied: it was found to be practically irrelevant (11.1% of the features in males and 22.2% in females only were different at $P = 0.05$).

For what concerns the sex differences, more than one-third of them were found differently distributed between the two sexes. This question as well as the question of age influence on non-metric traits will be the subject of further research.

Some of the non-metric features tested showed unusually high frequencies. We may quote as examples: *os Incae* (3.9% in females and 14.3% in males), *tuberculum praecondylicum* (8.7% in females and 11.5% in males), *sternebrae* (5.2% in males and 6.1% in females),

canalis sacralis apertus, totally or partially (26.1% in males and 27.5% in females), *spondylolysis* (3.7% in females and 13.5% in males), sacralisation of the fifth lumbar vertebra (5.8% in males and 11.7% in females), lumbalisation of the first or second sacral vertebra (7.3% in females and 13.2% in males) and sacralisation of the first and second coccygeal vertebra (16.1% in females and 28.9% in males). This phenomenon was attributed to the high rate of inbreeding in this population. This conclusion seems to exclude the hypothesis advanced by some authors that the above-mentioned burial complexes would represent war cemeteries (Roman legionaries or auxiliary troops) of obviously heterogeneous origin (Strouhal & Jungwirth, 1971). On the contrary, on the basis of the results of this piece of research, the buried people seem to belong to a homogeneous population.

To evaluate the relationships among the population of complexes CI–III at Sayala with some more or less contemporary populations, 20 discrete traits from the list of 30 traits studied by Berry, Berry & Ucko (1967) were chosen. Eleven samples of Ancient Egyptians (Badari, early Naqada, late Naqada, Hieraconpolis, Abydos, Tarkhan, Sedment, Qurna, Qau, Giza and Hawara) were utilized for comparison. They cover a time-span of more than 4000 years (from the beginning of the 4th millennium B.C. to the 4th century A.D.). In the same time interval, 15 of the 18 features studied by Rightmire (1972) in contemporary East African Negroes (Rwanda and Rundi) and in South African Negroes (Zulu, Xosa, Sotho and Venda), were also chosen. The frequency ranges of the three Sayala complexes (males and females combined, bilateral traits evaluated on the left side only) were compared by a graphic method with the ranges of both Ancient Egyptians and contemporary Negroes. The results clearly show (see Figure 1) that the Sayala CI–III population does not resemble either of these groups: 55.0% of the features showed, in fact, different distribution in the comparison between Sayala and Ancient Egyptians, and 66.7% between Sayala and the contemporary East and South African Negroes.

To evaluate the relationships between the CI–III populations and the samples from A cemetery, the frequencies of the above 22 discrete traits were reported in the same diagram: 59.1% of the features showed different distributions, thus suggesting that no genetic relationship exists between these contemporary cemeteries. Concerning N cemetery, the frequencies of the same set of 22 discrete traits were also different if compared with the ones of burial complexes CI–III, but this finding is based on an insufficient number of cases (6–12). Therefore, the question of mutual connexion between these two population samples cannot yet be solved by means of the epigenetic traits.

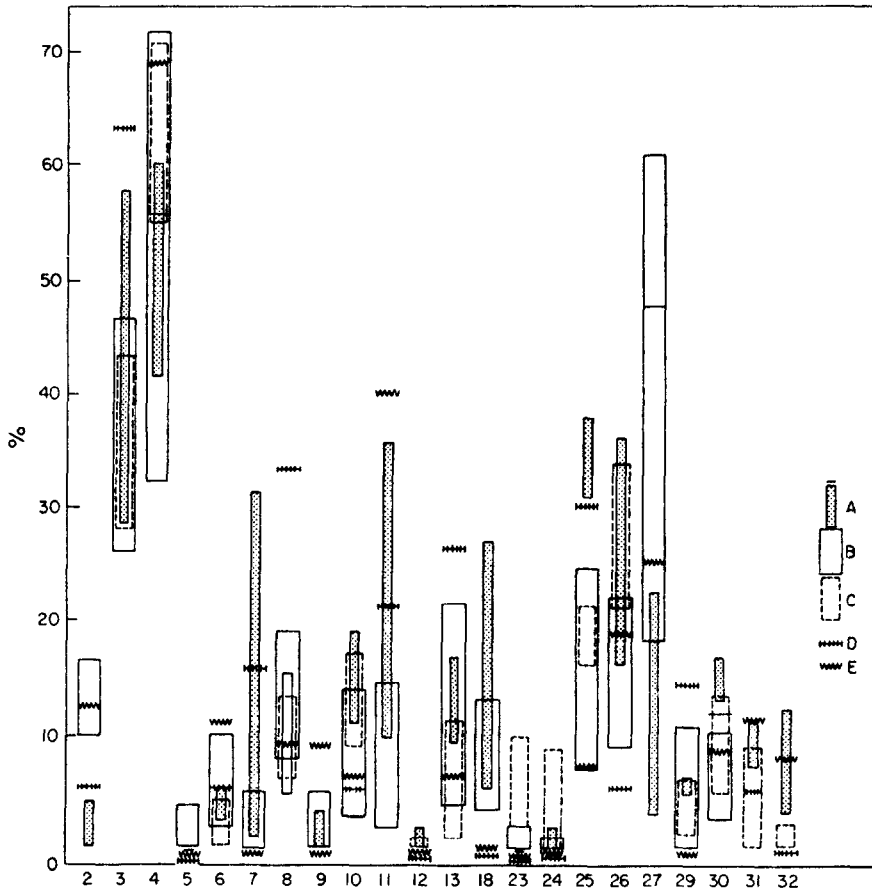
Moreover, the frequencies of the same 22 discrete traits of the much older Middle Kingdom C-group people from the same locality (Strouhal & Jungwirth, 1980) were also reported in the same diagram and compared with the ones of the CI–III sample. In 59.1% of cases the frequencies did not correspond, thus suggesting that no genetic continuity exists between these population samples.

We consider the above results obtained by the graphic method as preliminary only. C. A. B. Smith's measure of divergence firstly employed by Grewal (1962) in mice has to be calculated in order to test their significance.

4. Conclusion

In conclusion, on the basis of the discrete traits studied, we may consider the three burial complexes CI–III as being genetically linked to some extent, allowing for some degree of isolation, maybe as an expression of social units with some marriage boundaries which would have favoured high rates of inbreeding. These people were not related either

Figure 1. Epigenetic features of the Sayala samples, some Ancient Egyptian samples and the contemporary African Negro series. 2-30: Epigenetic features numbered according to Berry, Berry & Ucko (1967); 31: frequency of *os Incae* (occipital bone); 32: frequency of *os Japonicum* (zygomatic bone); A: range of frequency values of Sayala CI-III series; B: range of frequency values of Ancient Egyptian series (Berry, Berry, & Ucko, 1967); C: range of frequency values of the contemporary African Negro series (Rightmire, 1972); D: frequency values of the Sayala A cemetery series; E: frequency values of the Sayala C-group series.



to the more or less contemporary people of A cemetery, nor to the 2000 years older C-group population. Their genetic set-up was different from the Ancient Egyptians as well as from the East and South African Negroes.

These results agree with the hypothesis that the Sayala CI-III series would represent the Blemmyes, a population originating from the Eastern Desert.

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