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Dye Tests on Textile Samples from Alington Avenue, Dorchester

Penelope Walton 1 September 1986

Four samples were provided for dye analysis by Elisabeth Crowfoot. All of the fragments came from one burial (W98.4378) and may originally have been part of the sane garment. However, as they had survived as different shades of colour (sample 1 light brown, samples 2 and 3 dull purple, and sample 4 dark brown) they were tested separately.

Preliminary tests

All four samples were put through the usual procedure for archaeological specimens, by warming each piece in a series of solvents and by measuring the light-absorption of the extracts in a UV/Visible spectrophotometer[1].

Sample 1 gave no indication of the presence of dye. The spectrophotometer graphs of 2 and 4 were similar to the graphs of indigotin in the same solvents, but regularly had a main peak 5-6nm lower than indigotin: this behaviour suggested the presence of 6,6'-dibromoindigotin. The graphs of sample 3 had broader curves, covering the peaks of both dibromoindigotin and indigotin: it was possible that both chemicals were present in this dye.

Tests for dibromoindigotin

Samples 1 and 4 dissolved in the last test and therefore took no further part in the analyses. However, samples 2 and 3 were better-preserved and still retained a considerable amount of purple dye after the preliminary testing. These samples were therefore warmed in (a) undiluted pyridine and (b) concentrated sulphuric acid, the preferred solvents for extracting and identifying dibromoindigotin. A sample of indigo-dyed yarn (i.e. indigotin) was run as a control.

The pyridine extract of sample 2 gave a graph with a peak 10nm lower than indigotin, confirming the presence of dibromoindigotin[2]. Again, sample 3 gave a broader peak suggesting the presence of indigotin and dibromoindigotin. In sulphuric acid the fibres dissolved, so that the dye extracts were murky - a problem encountered by other analysts of archaeological specimens[3]. However,

the graph of sample 2 had a warp at 548nm, which is the position of the main peak of dibromoindigotin in sulphuric acid[4]. No warps were visible in the graph of sample 3 in sulphuric acid.

Results

Sample 1: light threads from left clavicle, 1174.....no dye detected
Sample 2: purple threads adhering to left scapular, 1176....dibromoindigotin
Sample 3: deteriorated textile, areas ?purple, 1172...?dibromoindigotin plus ?indigotin
Sample 4: detereiorated textile, areas ?dark brown.....dibromoindigotin

Remarks

Dibromoindigotin is the main constituent of the purple dye derived from shellfish such as Thais Haemastoma, Murex brandaris, M.trunculus and Purpura spp. The dye from M.trunculus is reported to contain both dibromoindigotin and indigotin[5] but indigotin may also form as dibromo-indigotin decomposes[6]. The possible presence of indigotin in one of the Dorchester samples may represent a stripe of colour from M.trunculus or, more probably, the decomposition of one area of dye ahead of the rest.

Shellfish, or 'Tyrian', purple was the most expensive and prestigious dye of the ancient world. Its use goes back into pre-classical history in Syria and Crete, but by Pliny's time the shellfish were being collected in many parts of the Mediterranean and used for the dress of senators, officials and ypung boys of rank[7].

Findings of the dye in textiles have been rare. One example is recorded from Enkomi, dated to the 1st century BC[8]; another has been identified in a 5th century Coptic tapestry medallion[9]; two more are recorded from Nubia and Palestine[10];and a fifth example has been identified in a silk damask in the treasury at Cologne[11]. Purples much more frequently prove to have been made by combining red and blue dyes, or by using lichens such as Roccella spp, which yield a ridh, if less colour-fast purple[12].

The Dorchester example is the first finding of shellfish purple from a British site. Alhtough there is an Irish shellfish Purpura lapillus which yields a similar dye, there is no evidence that it was exploited in the Roman period. It is much more likely that the Dorchester textile was produced in one of the purple-dyeing centres of the Mediterranean.

The presence of the dye in a burial suggests a person of some wealth and status.

References

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