

FIBER DEGRADATION ANALYSIS OF THE TEXTILES FROM THE Hwasung KUPORI SITE. Ahn C.S. Department of Clothing and Textiles, University of Inchon, Inchon 402-749, Korea.

Varied amount of fiber deterioration occur during production and usage of any textile. When the textile is discarded and buried in the soil, additional damages occur due to the action of microbes such as fungi and bacteria. In the case of burial shrouds, fiber damages due to biological cause exceed damages which occur otherwise since the body fluid acts as sufficient nutrition supply for the microbes. Any such fiber damage which causes modification and disruption of molecular structure can be observed as deterioration of fiber's external appearance (fiber morphology), using the microscopic analysis. According to Hearle, Lomas, Cooke, and Duerdon (1989), degradation due to production and wear may be observed as flattened yarn crown, abraded surface, fibrillation, or transverse fiber break. On the other hand, degradation due to micro-biological attack is commonly shown as a change in color, brittleness, and the presence of "eaten" holes. This research was aimed to investigate whether or not the morphological characteristics identified by Hearle, et al. indeed coincide with those of the actual exhumed textiles of archaeological origin.

The archaeological textiles examined in this research were excavated from the grave of Admiral Choi (1636~1698) which was found at Kupori of Hwasung-Goon, Kyunggi-do in June, 1994. Earlier study on the Kupori textiles revealed that most of the textiles were made with silk fibers and that the textiles were heavily contaminated with microbes. Based on the prior research, the objectives of this study were: first, to identify the types of fiber morphologies which could be attributable to the long-term burial, and second, to analyze whether there was a noticeable difference between the degree of fiber damage of the exhumed textiles and that of the modern, naturally aged textiles. Modern silk textiles which have histories of approximately 15~20 years of usage and storage have been used as the controlled samples to identify and compare the fiber damages due to long-term burial. The fiber morphologies of the Kupori and the modern textiles were analyzed using the light microscopy (Olympus BX60 System Microscope) and the scanning electron microscopy (JEOL 840 SEM). Microscopic analyses of the Kupori samples exhibited a variety of fiber morphologies such as peeling of fiber surface leading to fibrillation, transverse breakage, attachment of non-fibrous matters on the surface, and the presence of "eaten" holes. The findings indicated that the fiber morphologies of the Kupori textiles indeed coincided with the damaged fiber types asserted by Hearle, et al. The examined fiber morphologies represent fiber damages due to production and use as well as those due to long-term burial.

Hearle, J.W.S., Lomas, B., Cooke, W.D., & I.J. Duerdon. (1989). *Fibre failure and wear of materials: An atlas of fracture, fatigue and durability*. New York: John Wiley & Sons.