

Lessons from a Large-Scale Survey of Parchment Animal Origin and Production Quality

Parchment manuscripts sit at the nexus of digital, biological, and physical sciences, history, art, and literature. Can a simple polymer eraser link these together? Traditionally, an eraser is an article of stationery used to remove writing from paper. Yet when combined with biomolecular analysis, it can also be a medium to ascertain the animal identity and production quality of medieval manuscripts. The eraser strokes the parchment, generating a strong electrostatic charge that lifts the grime from the parchment surface; trapped in the grime are tiny amounts of biomolecules from the parchment itself—small samples yes, but enough to be analyzed by modern instruments. Parchment books and documents are the fundamental vehicle for the transmission and preservation of a millennium's worth of written culture. Hence, their systematic study (paleography, codicology, and diplomatic) have long been recognized as essential disciplines for many areas of humanistic study. For scientists, however, the parchment record of the past represents an unrecognized and untapped reservoir of genetic and biological information. And because a considerable number of parchment books and documents can be precisely dated and localized, the molecular information derived from them has enormous yet largely unrealized value for the fields of bioarcheology, paleozoology, anthropology, and historical ecology. Both manuscript studies and biomolecular research are, in a sense, forensic: the former because the disciplines of paleography and codicology

depend on exacting study of regularities in human production of one class of artifact; the latter because biomolecular analysis yields the DNA of the animal that provided each individual leaf. However, these disciplines currently stand at opposite ends of the epistemological spectrum. Students of manuscripts and texts have long recognized that the most exacting study of individual artifacts is the necessary foundation of their work, even when they seek larger patterns. Science in contrast is moving toward a new mode of cognition enabled by mechanical information generation techniques. Colloquially known as Big Data, this new approach turns the old hypothetico-deductive model on its head to harvest data and share it across networks so that analysis is done by large teams seeking patterns in the data rather than seeking to corroborate prior hypotheses. With the collaboration of colleagues worldwide who have sent us eraser shavings from parchment, we are building up evidence of the exploitation of past animal populations and their distribution in time and space, and are adding a new category of evidence concerning the provenance of unlocalized manuscripts.

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