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THE PALIMPSEST THAT WASN'T: ERASURE, FORGERY, AND THE LIMITS OF MULTISPECTRAL IMAGING

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Abstract Multispectral and hyperspectral imaging have transformed the study of erased and overwritten manuscripts, allowing scholars to recover undertexts once assumed lost beyond recovery, most famously in the case of the Archimedes Palimpsest. This success has produced a widespread, largely unexamined assumption within manuscript studies: that imaging technology is capable of distinguishing, reliably and in all cases, between genuine erasure produced by manuscript reuse and erasure or alteration introduced by later forgers, restorers, or well-meaning conservators. This article argues that this assumption is not warranted by the imaging technology itself, and that multispectral recovery, while extraordinarily powerful for reading suppressed text, is comparatively weak as a tool for establishing the authenticity and chronology of that text's erasure. The article surveys the technical basis of multispectral and hyperspectral imaging as applied to parchment and papyrus, distinguishes the kinds of questions the technology can and cannot answer, and examines documented cases in which imaging results were initially treated as settling questions of authenticity that they had not, in fact, settled, including instances of retouched or supplemented undertexts and disputed medieval and early modern forgeries discovered only through subsequent codicological and chemical analysis. The article contends that the interpretive gap between "the imaging recovered a text" and "the imaging established that this text is original and this erasure is authentic" has been insufficiently theorized in the manuscript studies literature, which has tended to treat successful image recovery as self-authenticating. Drawing on the philology of textual criticism and on conservation science, the article proposes a set of methodological safeguards, including mandatory codicological and material corroboration before imaging results are cited as evidence of authenticity, and argues for a sharper disciplinary distinction between recovery and verification as two related but logically separate achievements.

Keywords: Palimpsest, multispectral imaging, hyperspectral imaging, manuscript forgery, codicology, textual criticism, undertext, parchment analysis, digital humanities, manuscript authentication.

Introduction The recovery of the Archimedes Palimpsest, in which multispectral imaging revealed previously illegible mathematical treatises beneath a thirteenth-century prayer book, stands as one of the signature achievements of digital manuscript studies. The project demonstrated that texts long presumed permanently lost to scraping and overwriting could, under the right imaging conditions, be read again, and it established multispectral and later hyperspectral imaging as standard tools in the codicologist's repertoire. In the years since, imaging has been applied to a wide range of erased, damaged, and overwritten manuscripts, with results regularly reported in both specialist and popular venues as recoveries of genuine, previously hidden textual layers.

This success has, however, produced a habit of inference that this article treats as worth interrogating directly. When imaging recovers a legible undertext, the recovery is often taken, implicitly or explicitly, as evidence not only that the text existed but that the erasure covering it was a genuine, historically motivated act of manuscript reuse — a scribe scraping a used parchment for reuse, in the ordinary economic logic of a manuscript culture where writing material was costly. But erasure has other possible causes. Text can be removed or altered by later restorers attempting to "improve" a damaged manuscript, by owners seeking to suppress or falsify content, or, in the more troubling case this article foregrounds, by forgers who introduce an artificial undertext, or manipulate a genuine one, precisely because they anticipate that a recovered "hidden" text will carry greater authority and market value than an openly written one.

Multispectral and hyperspectral imaging, this article argues, is not well suited to distinguishing among these possibilities on its own. The technology answers a narrower question than is often assumed: it can show that pigment or ink of a particular chemical signature is present beneath a visible surface layer, and it can often render that hidden layer legible. It cannot, by itself, establish when that hidden layer was written relative to the surface layer, whether the erasure was contemporary with the manuscript's working life or introduced centuries later, or whether the entire configuration was staged by a later hand. These questions belong to codicology, paleography, and material science, not to imaging in isolation, yet imaging results are frequently reported and recei ved as though they answered them.

This article develops that argument through a review of the relevant technical and philological literature, an examination of representative cases where imaging-based conclusions were later revised or complicated by codicological and chemical evidence, and a set of proposed methodological safeguards for the field.

Literature Review The technical literature on multispectral and hyperspectral imaging of manuscripts is well established, anchored by the published methodology of the Archimedes Palimpsest project under Reviel Netz and William Noel, and by the imaging science contributions of Roger Easton and William Christens-Barry, whose work developed much of the standard processing pipeline now used across the field. This literature is primarily concerned with optimizing recovery — improving legibility of faint or degraded undertexts — rather than with questions of authentication, which are generally treated as a separate, downstream concern for codicologists and conservators.

The codicological and conservation-science literature, by contrast, has long emphasized that ink, pigment, and parchment analysis are essential for dating and authenticating manuscript content, and that visual or even chemical recovery of a text is not equivalent to establishing its date or authenticity. Christopher de Hamel's writing on manuscript forgery and manuscript culture more broadly documents numerous cases in which apparently ancient material was later shown, through codicological rather than purely visual analysis, to be later intervention. Work on the chemistry of iron-gall and other historical inks, including studies applying Raman spectroscopy and X-ray fluorescence to manuscripts, demonstrates that ink dating requires techniques largely independent of the optical imaging used to recover erased text.

What is comparatively underdeveloped is literature explicitly addressing the inferential gap between these two bodies of work: the point at which a successful multispectral recovery stops answering a legibility question and starts being treated, often without further corroboration, as answering an authenticity question. This article positions its contribution at that junction.

Main Body The core technical fact underlying this article's argument is straightforward. Multispectral and hyperspectral imaging works by capturing a manuscript surface across many narrow bands of the electromagnetic spectrum, typically extending beyond the visible range into the ultraviolet and infrared. Because different inks and pigments absorb and reflect light differently across these bands, an undertext that is invisible to the naked eye in ordinary light can become visible when the image is processed to maximize contrast at the wavelengths where the erased ink's residual signature differs most from the surface text and the parchment itself. This is a genuinely powerful technique, and its successes, from the Archimedes Palimpsest to numerous smaller-scale recoveries of erased biblical, classical, and documentary texts, are not in question.

What the technique measures, however, is a present-day physical property of the object: the differential spectral response of residual ink or pigment traces relative to their surroundings. It does not directly measure when that ink was applied, when it was scraped or washed away, or how many textual layers may be present and in what relative chronological order beyond what can be inferred from stratigraphic overlap visible in the imaging itself. In straightforward cases, where a manuscript's physical history is otherwise well documented — a known scriptorium, a continuous provenance trail, and codicological features consistent with ordinary parchment reuse — this limitation rarely matters, because the broader evidentiary context already supports the assumption that the erasure is a genuine, period-appropriate act of reuse. The imaging then simply confirms and makes legible what codicology has already made plausible.

The limitation becomes consequential in a smaller but significant number of cases where a manuscript's provenance is uncertain, contested, or itself the subject of authenticity concerns, precisely the cases in which imaging results are most likely to attract scholarly and public attention. In such cases, a recovered undertext can be presented, sometimes inadvertently and sometimes not, as though its recovery settled the very authenticity question that motivated the imaging in the first place. Documented instances exist in which manuscripts later shown, through codicological or chemical analysis, to involve later intervention had nonetheless yielded technically successful multispectral recoveries of legible under-layers, layers that were real in the narrow sense of being physically present and imageable, but whose relationship to the manuscript's claimed history was subsequently found to be far more complicated than an initial imaging-based announcement had implied. In several such cases, it was not the imaging itself that ultimately resolved the authenticity question, but independent codicological features — quire structure, ruling patterns, script forms inconsistent with the claimed date — or independent material analysis of ink composition, parchment preparation, or binding, that revealed the intervention.

This pattern points to a structural asymmetry in how imaging results circulate. A successful recovery is visually dramatic and straightforwardly reportable: an image that was blank now shows text. A codicological or chemical caveat, by contrast, is technical, incremental, and rarely as visually or narratively compelling. The result is that recovery announcements travel faster and further than the corroborating or complicating codicological work that should accompany them,

both within scholarship and, more acutely, in public and journalistic coverage of palimpsest discoveries. Manuscript studies, this article argues, has not yet developed a settled disciplinary norm requiring that multispectral recovery claims be paired, as a matter of course, with independent material corroboration before being treated as resolving questions of date or authenticity, rather than only questions of legibility.

Research Methodology This article uses a qualitative, case-comparative methodology grounded in the published technical and codicological literature on multispectral manuscript imaging. Cases were selected on the basis of two criteria: first, that multispectral or hyperspectral imaging played a documented, publicly reported role in recovering an undertext; and second, that subsequent scholarship, whether codicological, chemical, or archival, either confirmed, complicated, or revised the initial interpretation of that undertext's date, authenticity, or relationship to the manuscript's surface text. This selection criterion deliberately privileges cases where a later corrective or corroborating step is documented, since these are the cases most informative for evaluating the inferential gap this article is concerned with; it does not attempt to survey the full population of multispectral imaging projects, the majority of which involve uncontested manuscripts where no such gap becomes visible.

For each selected case, the analysis distinguishes three components of the published record: the imaging methodology and its direct output (what was made legible and how); any claims made, at the time of the imaging results' publication or announcement, about the date, authenticity, or historical significance of the recovered material; and the subsequent codicological, chemical, or archival work, where it exists, that bears on those claims. This tripartite distinction allows the analysis to isolate precisely where, in the published record, an inference moved from "this text is now legible" to "this text's status as an authentic period erasure is established," and whether that move was supported by evidence external to the imaging itself.

The methodology's principal limitation is that it depends on the published record being reasonably complete and transparent about the sequence of investigative steps, which is not always the case, particularly for older or less thoroughly documented imaging projects. Where the published record was ambiguous about this sequence, the case was noted as inconclusive for the purposes of this article's argument rather than assigned to either category.

Results The case comparison confirms that the inferential gap identified in the Main Body is not hypothetical: in the cases examined, multispectral or hyperspectral recovery of an undertext reliably established the legibility and physical presence of that undertext, but did not, on its own, reliably establish claims about the undertext's date or its relationship to a genuine, period-appropriate act of manuscript reuse. In every case where a subsequent authenticity concern arose, its resolution depended on codicological or material evidence external to the imaging process itself, rather than on further refinement of the imaging.

The results also indicate that the timing of public and scholarly reporting frequently outpaced the completion of this corroborating work. In several of the cases surveyed, initial reports of successful recovery preceded, sometimes by a considerable interval, the codicological or chemical analysis that ultimately clarified the material's status, creating a period during which the

recovered text circulated in scholarly and public discussion with an authenticity status that later evidence would complicate.

Cases involving manuscripts with well-documented, uncontested provenance did not show this pattern to any significant degree, since in these cases the imaging results were consistently read alongside, rather than in place of, an already well-established codicological context. The gap this article identifies is therefore concentrated specifically in cases of contested or uncertain provenance, which is precisely where its consequences are most significant.

Discussion These findings support a central claim of this article: that multispectral and hyperspectral imaging should be understood, disciplinarily, as a recovery technology rather than an authentication technology, and that manuscript studies has not yet fully internalized this distinction in how imaging results are reported, cited, and received. This is not a criticism of the technology or of the scholars who developed and applied it; the imaging science literature itself is generally careful about the scope of its own claims. The gap identified here arises less from the technical literature than from how its results are subsequently taken up, cited, and reported in secondary discussion, where the distinction between recovery and authentication is easily, and often silently, collapsed.

The concentration of the problem in cases of contested provenance is itself instructive. It suggests that the risk is not evenly distributed across the field but is highest precisely where the stakes of getting the authenticity question right are also highest, since contested manuscripts are disproportionately likely to be commercially, politically, or religiously significant. This is also where the incentive to treat a dramatic recovery as self-authenticating is strongest, whether the pressure comes from owners, dealers, funding bodies, or the scholarly desire for a clean and reportable discovery.

The proposed safeguard, that multispectral recovery claims affecting date or authenticity be paired as a matter of disciplinary norm with independent codicological or material corroboration before being treated as settled, is consistent with existing best practice in conservation science and textual criticism, but the results here suggest it is not yet consistently applied, or at least not consistently communicated, in how such findings reach the broader scholarly and public record.

Conclusion This article has argued that the celebrated successes of multispectral and hyperspectral imaging in recovering erased manuscript texts have produced an unexamined tendency to treat successful recovery as equivalent to established authenticity, when the two are logically and evidentially distinct achievements. Imaging technology answers, with considerable power, the question of what physical traces of ink or pigment remain beneath a manuscript's surface and how they can be rendered legible. It does not, on its own, answer the further questions of when that undertext was written, when and why it was erased, and whether the entire configuration reflects genuine period manuscript reuse rather than later intervention, whether well-intentioned restoration or deliberate forgery.

The case comparison undertaken here shows that this gap has real consequences, concentrated specifically in manuscripts whose provenance is already uncertain or contested, where the resolution of authenticity questions has consistently depended on codicological and material

evidence external to the imaging process, evidence that has sometimes lagged behind the initial public reporting of a successful recovery. This lag matters because recovery announcements are more visually and narratively compelling, and therefore travel further and faster, than the slower, more technical corroborating work that should properly accompany claims about a recovered text's authenticity.

The remedy proposed here is modest and consistent with existing good practice rather than a call for new technology or new institutions: a firmer disciplinary norm, applied consistently in publication and public communication, that treats multispectral and hyperspectral recovery as a necessary but not sufficient step toward authentication, to be paired with independent codicological, paleographic, and material analysis before conclusions about a recovered text's date or authenticity are presented as established. Manuscript studies has, over more than a century, developed rigorous source-critical standards for evaluating the authenticity of visible, uncontested texts; this article's contribution is to argue that recovered, previously invisible texts deserve no less rigorous a standard, and that the excitement of recovery should not be allowed to substitute for it. The palimpsest that was not what it seemed is, ultimately, a reminder that legibility and truth, however often they coincide, are not the same achievement.

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