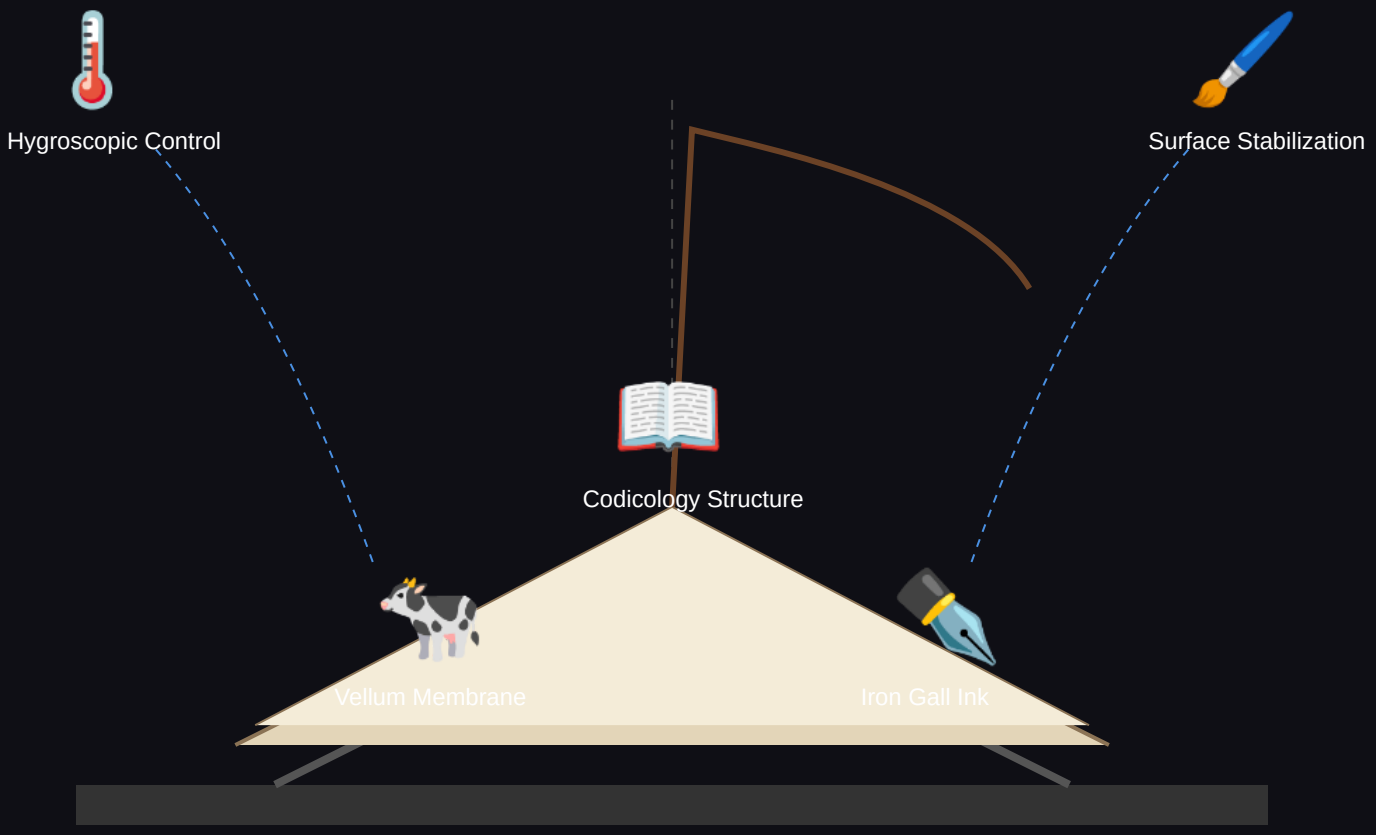

Vectree

Conservation science and preservation of 15th-century incunabula and vellum manuscripts

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VECTREE · KNOWLEDGE MAP

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🐄 Vellum Membrane

Vellum is prepared from the skin of young animals, specifically calves, goats, or sheep, through a process of liming, scraping, and drying under tension. Unlike leather, it is not tanned, making it highly susceptible to fluctuations in Relative Humidity (RH).

Conservation of vellum requires maintaining an environment where the collagen fibers do not undergo ‘glass transition’ or gelatinization. If vellum gets too dry, it becomes brittle and may crack; if too damp, it can revert to a glue-like state or support fungal growth.

✒️ Iron Gall Ink

Commonly used from the medieval period through the 19th century, iron gall ink is created from vitriol (ferrous sulfate), tannins (from oak galls), and a binder like gum arabic. Its chemistry is inherently problematic because it contains sulfuric acid and free iron(II) ions.

The iron ions catalyze the oxidative degradation of the substrate (cellulose or vellum), while the acid causes hydrolysis. This leads to ‘ink corrosion,’ where the writing literally eats through the page. Conservators use chelating agents like calcium phytate to stabilize these ions.

📖 Codicology Structure

The 15th-century binding is a complex mechanical object. It typically consists of folded vellum ‘gatherings’ or ‘quires’ sewn onto supports (cords or tawed skin thongs). These supports are then laced into heavy wooden boards, often oak, and covered in leather.

Preservation involves ensuring the ‘throw-up’ (how the spine arches when opened) does not stress the sewing. Mechanical failures often occur at the joints (where the boards meet the spine), requiring delicate re-backing or ‘tacketing’ to restore structural integrity without losing historical evidence.

🌡️ Hygroscopic Control

Historical manuscripts are ‘hygroscopic,’ meaning they constantly exchange moisture with the surrounding air. Rapid changes in humidity cause the vellum to expand and contract at different rates than the ink and gold leaf, leading to flaking and warping.

Preventive conservation dictates a ‘passive’ climate control strategy, using thermal mass and high-performance display cases (vitrines) to buffer against environmental spikes. UV radiation is also strictly filtered to prevent the photo-oxidation of organic dyes and the yellowing of binders.

🖌️ Surface Stabilization

When the physical matrix of the manuscript fails—such as flaking pigments or torn vellum—conservators perform micro-interventions. A primary tool is Japanese long-fiber tissue (like Kozo) adhered with wheat starch paste, chosen for its strength, transparency, and reversibility.

Consolidation of pigments often involves ultra-thin applications of Isinglass (sturgeon bladder glue) or synthetic resins like Klucel G. The goal is ‘minimal intervention,’ preserving the maximum amount of original material while ensuring the object can be handled for scholarly research.