Title:
Biological Insights from Historical Persian Manuscripts: Unveiling the Cellular and Molecular Effects of Traditional Paper Dyeing and Sizing Techniques

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Abstract:
In the context of cellular and molecular biology, traditional practices from historical cultures often provide unique insights into material interactions at the microscopic level. This keynote presentation will explore the biological implications of historical dyeing and sizing techniques used in Persian manuscripts, specifically focusing on their effects at the cellular and molecular levels, which have contemporary relevance for paper conservation and preservation.

Drawing from two of my recent studies, the first part of the presentation will examine the use of henna as a paper dye during the Timurid and Safavid periods. Our research has uncovered that the traditional 1:10 ratio of henna to water, recommended in Persian treatises, is not only crucial for achieving desired color effects but also exhibits significant fungicidal properties against *Aspergillus flavus* at a cellular level. This discovery underscores the molecular interactions between henna components and fungal cells, revealing the biochemical mechanisms that have been preserved in these historical practices.

The second part of the presentation will explore the molecular and cellular effects of various sizing materials used in Iranian manuscripts from the Timurid to Qajar periods. By reconstructing 15 traditional sizing recipes and analyzing their impact on paper properties, we have identified specific molecular characteristics that influence paper hygroscopicity, thickness, and resistance to mold growth. Our findings provide a deeper understanding of how these historical materials interact with cellulose fibers at a microscopic level, influencing both the physical properties of paper and its biological resilience.

This presentation will bridge the gap between historical material science and modern biological applications, offering a unique perspective on how traditional knowledge can inform current practices in paper preservation, with potential implications for understanding biological interactions in other material sciences.

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Prof. Dr. Mandana Barkeshli is a professor at the Institute of Creative Arts and Design at UCSI University in Malaysia, specializing in conservation science, particularly in the materials technology of manuscripts and miniature paintings. She serves as an Honorary Principal Fellow at the University of Melbourne, engaging in collaborative projects at the Grimwade Centre for Cultural Materials Conservation.
With a rich academic background, she has held senior positions at the Art Universities of Tehran and Isfahan, the International Islamic University in Malaysia, and was the inaugural Head Curator at the Islamic Arts Museum Malaysia. She was also the founder and chairman of the Islamic Manuscript Association in Cambridge and a Board Member of Directors. Her distinguished research has garnered numerous fellowships, including the Petra Kappert Fellowship at the University of Hamburg and the Barakat Trust in the UK.
Prof. Barkeshli's primary focus is on the material technology of Persian medieval manuscripts, examining papers, dyes, pigments, and sizings derived from historical recipes. She has published extensively in reputable international journals and recently launched a website, sharing her database on Persian manuscript materials: persianmanuscriptmaterials.org. Additionally, she has conducted professional workshops at esteemed institutions, including the Bodleian Library at Oxford and the Qatar Museum of Islamic Art.