**An Elusive Essence: Why We Cannot Recreate Ancient Perfumes and What We Learn from Trying Anyway**

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Interest over the last five years in the recreation of ancient perfumes is part of a broader effort to reconstruct the smells and other sensory experiences of the past. Recent archaeological discoveries, by identifying traces of aromatic materials such as dammar, elemi and patchouli, suggest that we are closer than ever[1,2,3]. Yet, despite these advances, two fundamental challenges prevent us from fully recovering the scents of the past. The first we can call "the reverse engineering problem": organic residue analysis can identify natural materials, but reconstructing mixtures is far more complex; even if we knew which compounds were present, the methods used to process them were just as crucial to the final scent, and archaeometry has little to say about them. The second, and more serious, is "the problem of missing targets": without surviving ancient perfumes, there is no direct reference for what they should smell like. How can we judge the success of our historical recreations without a sensory benchmark?

Rather than attempting to recreate the scents of the past, the *Alchemies of Scent* research group, a Czech Science Foundation-funded initiative in the history of chemistry, focuses instead on how ancient perfumes were made in Egypt and Greece. And to do this, we turn to the best surviving evidence: ancient recipes[4,5]. These texts, found in temples, on scraps of papyrus, and in ancient medical handbooks, preserve sophisticated techniques for extracting, concentrating, and blending scents from materials such as myrrh, calamus, galbanum, and lily. Through lab-based experimental models, we investigate these processes, reconstructing lost techniques in the history of perfumery and chemistry. This approach offers two key insights. First, shifting the focus from final products to production methods deepens our understanding of the chemistry behind ancient perfumery. Second, comparing results with expectations reveals modern biases about historical scents—why do some seem more 'authentic' than others?

In this presentation, I will share our experiences with this approach: the gaps in our knowledge, the baffling ingredient proportions, the difficulties of replicating experimental results, and the lingering uncertainty—even when something smells beautiful—of whether we have truly captured ancient scents or merely reconstructed a version shaped by modern expectations.

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