

## Finding Out Egyptian Gods' Secret Using Micro-Analytical Chemistry:

### *Biomedical Properties of Egyptian Black Makeup Revealed by Microamperometry at Single Cells*

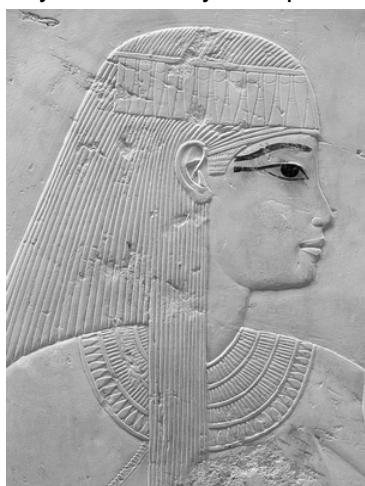
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Ancient Egypt black eye make-up is reputed. However, surprisingly, most social categories used materials similar in textures and composition. As happens today with shampoos (i.e., with identical compositions but different prestige due to the brand reputation) only origin and quality of the make-up phials differentiated upper and lower classes users. This is puzzling since, contrary to shampoos, make-ups do not serve any functionality except for showing distinctive marks of social status.



The Louvre scientific laboratory added to this puzzle by demonstrating that the basic material used for such make-up was not natural but resulted from a long and elaborate, thus expensive, chemical transformation involving raw (galena, cerussite) and artificial (laurionite, phosgenite) lead materials. Ancient chemical procedures disclosed in papyri (Dioscorides) could be cast in modern chemical language and reproduced to afford the same micrometric faceted crystals with identical chemical composition and size. This is in fact the first reported example of “industrial-scale” wet chemistry.

A possible clue to the puzzle came upon remarking that ancient Egypt was not the dry land that one thinks today but a wet country copiously irrigated by the Nile and its overflows. A combination of water, heat and rich organic matter is tantamount to bacterial soup. As happens today in tropical countries, ancient Egyptians had to control endemic bacterial diseases which proceed essentially through eye contact with contaminated water.

This prompted us to investigate the possible effects of the make-up composition on single cells. These studies revealed that these crystals have specific anti-bacterial effects absent from its raw materials, by provoking NO<sup>o</sup>-based oxidative stress into exposed cells. In turn, the released NO<sup>o</sup> induces chemical signalling and vasodilatation of blood capillaries thus increasing the flux of macrophages to the eye further protecting it from most bacterial intrusion.<sup>1</sup>

Hence, this study established that ancient Egyptians chemically engineered more than 26 centuries ago the first mass production of a bioactive material for its medicinal properties.