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(a)

(b)

(c)

Plat

ESPI

interferogram before restoration; (c) ESPI interferogram after restoration.

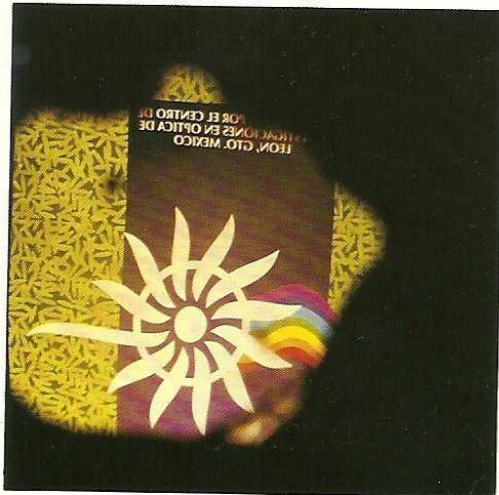


Plate 22.1. Image of printed letters and colour symbol reflected from an Olmec mirror. Photographed by the author.

LÁMINA CENTRAL DO LIVRO EDITADO PELA INTERNATIONAL COMMISSION FOR OPTICS
DESTACANDO UMA FOTOGRAFIA QUE LUNAZZI FEZ POR MEIO DE UM ESPELHO OLMECA

22 Olmec mirrors: an example of archaeological American mirrors*

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INTRODUCTION

This chapter is not intended to give all available information on the subject of the title, but just a simple description that may be of interest to the optical community. The author believes he has consulted most of the available scientific literature that can be traced through cross-referencing from the most recent papers.

Olmec mirrors are the most ancient archaeological mirrors from Mexico and constitute a very good example of ancient American mirrors. The oldest mirrors found in America are from the Incas, made about 800 years before the Olmecs, dated from findings in archaeological sites in Peru. How this technology would have been extended to the north, appearing within the Olmecs, later within the Teotihuacan civilization, a few centuries before the Spanish colonization, is an interesting matter. Mirrors are important also within the Aztec civilization that appeared in the vicinity of the Olmec and Teotihuacan domains at about the time of their extinction.

The extent of the geographic area where these mirrors were employed is not entirely well known. Those made of pyrite, the material of highest reflectivity, deteriorate very easily, making it difficult to recognize them as mirrors. Besides

* The colour plate section for this chapter appears between p. 304 and p. 305.

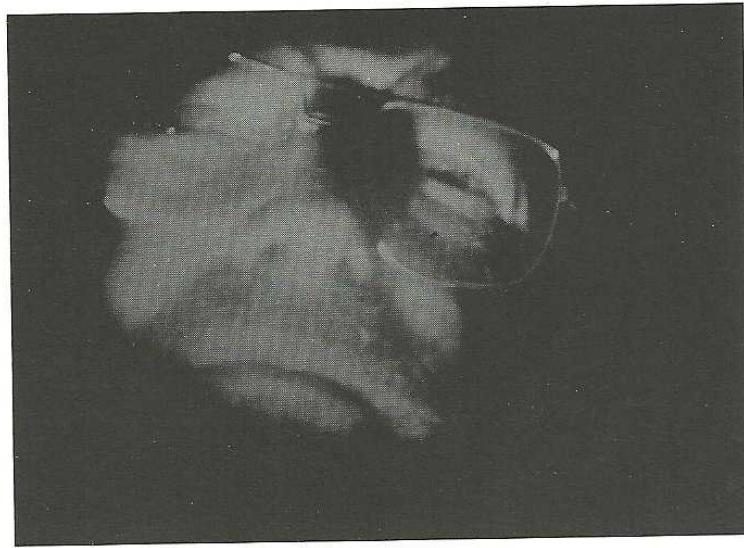


Fig. 2. Reflected image of a human face in a convex Olmec mirror. Photograph by the author.

of image is repeated in Plate 22.1. Six mirrors, five being concave and one convex, can be seen at the permanent exhibit of the 'Museo'.

THEIR SIGNIFICANCE IN THE CULTURAL CONTEXT OF THE OLMECS

The iconography shows that mirrors had an important presence in Pre-Columbian civilizations, giving even the name to an Aztec divinity 'Tezcatlipoca', which means 'the smoking mirror'. This god is represented as having a smoking mirror instead of one of his feet. According to a transcription [6], there is an Aztec myth that says that Tezcatlipoca, one of the minor deities, proposed to the other deities a visit to the main god Quetzalcoatl bringing a mirror draped in cotton. When Quetzalcoatl saw his face on the mirror, he cried because he thought himself to be a god but, having a human face, his destiny would also be human. Then he left the country announcing his future return. The remaining part of this myth has to do with the belief that the arrival of the Spanish conquerors represented the returning god, but it suffices for us to know that mirrors were an important element in Aztec mythology. Those mirrors were certainly a legacy from the Olmecs.

In many representations the mirrors are related to the sun god being fixed to his forehead [4] and with internal curved lines. This inner figure was interpreted as the curvature of straight lines distorted by an oblique angle of viewing. It appears displaced, occupying different positions in a way that makes us think about the image of the sun being visible on the mirror. The well-known sculptures of a feathered serpent, very common at the Teotihuacan

site, represent the serpent traversing the mirror [7]. To give an example of the capability of generating real images, we made the photograph of the image of one hand reflected in a concave Olmec mirror (Fig. 3).

These are good images although we could not work in ideal conditions: the focal length of a 105 mm objective was doubled by means of an additional diverging lens; also we were not allowed to remove the protective glass, which was traversed twice by the light at an angle of about 70° . We employed an aperture for the diaphragm of the objective on the camera of about 5 mm, to obtain an image similar to the one obtained by the naked eye. We employed KODAK TMAX 400 ISO film. Although there was ordinary glass between the mirror and the camera, and some deterioration may have occurred on the mirror surface, changing its original conditions, the image is very clear and appears floating in the air in front of the mirror. None of the bibliographic references we consulted indicate the possibility of images from the mirrors being present on the iconography as inverted images, which would certainly be an interesting finding.

We can imagine what strong feelings these images would have caused in the Olmec people from the existing records of other nearby civilizations. Drawings associating mirrors with serpents, human faces, eyes, cotton, water, flowers, butterflies and others have been described [7] for the Teotihuacan civilization. The representation of mirrors with a human-like eye inside could be the consequence of directly looking into a convex mirror of short focal length, but

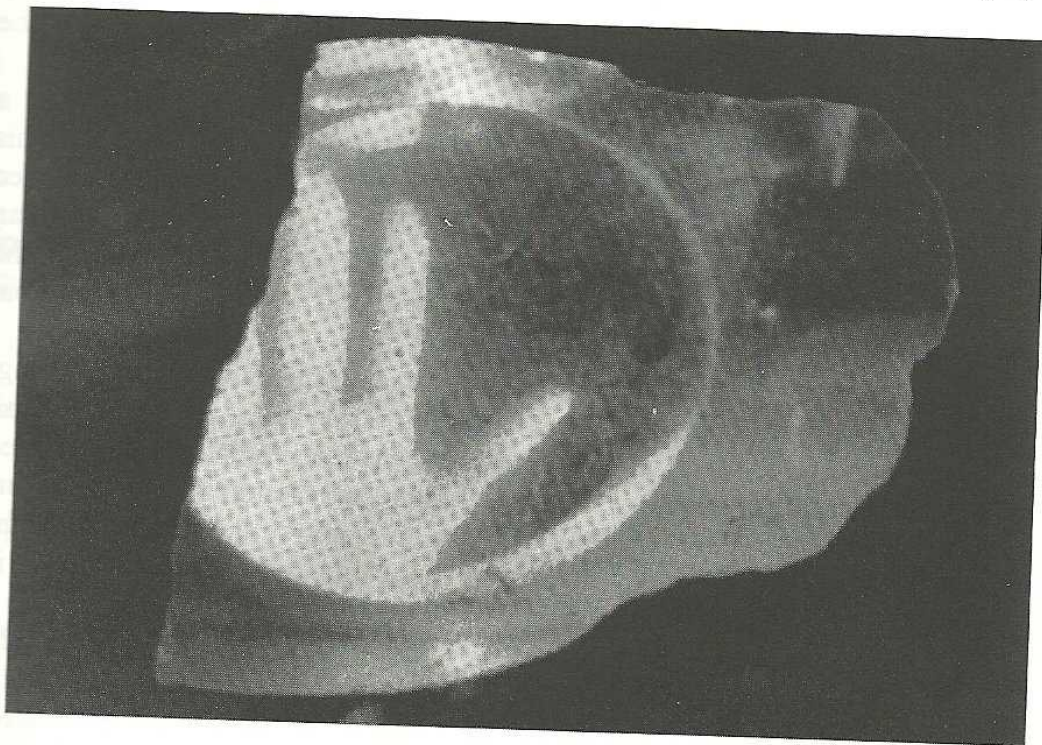


Fig. 3. Image of a hand obtained by means of a concave Olmec mirror. Photograph by the author.