



UNIVERSITÀ DI PISA

Military Museum of Sana

Restoration report

The objects coming from the Military Museum of Sana showed different conservation status.

Some of them (B 9634, mirror, B 9550, B 9551, camel statuette) did not undergo previous restoration actions. On their surfaces:

- parts with pitting corrosion attacks, a cyclic active corrosion of the cuprous chloride (Cu_2Cl_2)
- oxidation products due to the chemical transformation of metal in salt: the most obvious salts that you could see was: carbonate $\text{Cu}_2\text{CO}_3(\text{OH})_2$ (malachite) – copper oxide (Cu_2O) (cuprite) – traces of cupric oxide (CuO) (tenorite)
- encrusted, presumably from both limestone and siliceous source, spread on the surface.

Treatment done for clearing and stabilization process in order to a complete conservation and restoration of the pieces:

- repeated baths in distilled water;
- removal of siliceous, calcareous deposits and oxidation products with scalpels, fibreglass sticks, mini drill, air scaler, etc. to be carried out with use of binocular microscope in order not to damage the “noble patina” which was located under the various stratifications;
- complete dehydration of the objects using a laboratory-stove;
- repeated baths in Benzotriazole (BTA) to 3% methyl alcohol and final protection with microcrystalline wax SOTER 501/OC.

The rest of the objects (MSM 5902, 5903, incense burner, MSM 147, knots, B 9555) were already treated with acid, in times and ways unknown, probably recent). This caused the destruction of the corrosion products and of the “noble patina”. The treatment carried out in Pisa was the above mentioned ones, but with a longer period of immersion in distilled water, until the complete decline of the acid on the objects.

Different operations regarded the bronze finding MSM 6638. It was treated with acid and abusively reassembled with three separate objects, by means of glue mixed to sand resulting from the bronze oxidation (malachite), and small fragments of bronze, used as filling. The restoration treatment was similar to the above mentioned ones, but with the addition of acetone in order to dissolve the arbitrary integrations.

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