

## La Vela (TN), excavation campaigns 1987-1988. Mineralogical and chemical analysis carried out on red-pigmented finds in grave n.3

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**ABSTRACT** - Mineral and chemical analysis have been carried out in objects found in grave n. 3 at La Vela (Trento) to discover the nature of red pigmentation and the painting technique used. The most important result of the analysis is the identification of natural cinnabar in a regular stratum where it is mixed with clayey minerals rich in iron anhydrous oxides.

**KEY WORDS:** Trentino Alto-Adige, La Vela, Burial rites, Square Mouth Culture, Red pigmentation

**PAROLE CHIAVE:** Trentino Alto-Adige, La Vela, Riti funerari, Cultura dei Vasi a Bocca Quadrata, Pigmentazione rossa

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During excavations carried out from 1987 to 1988 at La Vela (TN) by the Ufficio Beni Archeologici of the Provincia Autonoma di Trento together with the Dipartimento di Scienze Filologiche e Storiche of the Università di Trento, seven graves, three of which were cist graves (graves 1,3,4) and the other four confined by stones (graves 2,5,6,7), were discovered in an anthropical area, with traces of stone structures (cobbled pavings) and pole-holes, attributed to the Square Mouth Pottery - hereinafter referred to as "VBQ", vases dating back by calibration to half way through the V millennium (BAGOLINI, 1990: 225). In the three cist graves, two of which were of adult women (graves 1,4) and one of a 4-5 year old child (grave 3), there were traces of red pigmentation (BAGOLINI, 1990:227; PEDROTTI, 1997:444-445). In the women's graves this colouring was limited to the skull, while in the child's grave, this colouring was found both on the skull bones and on some of the burial objects.

Traces of red pigmentation were present on the necklace and bracelet beads made from shell!

and in the surrounding soil. Red pigmentation was also found inside the little hemispheric bowl in the child's hand (Fig. 1).

In order to identify the nature of the colour, four samples were taken from: the skull bones, the soil around the necklace, the bracelet bead and from inside the little bowl. Consequently, due to the unexpected results of the initial analysis, research was focalised on the bead in order to identify the possible existence of a real "painting technique" on the surface of the material. In fact the beads that underwent optic stereo-microscope analysis showed a layer of uniform pigmentation on all the sides, even those inside the hole (Fig. 2).

The instrumental analytical techniques which took place were X-Ray diffraction (XRD), optic and electron microscopy (SEM) and elementary microanalysis with electron microprobe (EDS). Using these analytical techniques it was possible to identify and to observe the mineralogical components of the samples and to identify the chemical elements which were present.

A more closer analysis of the stratigraphic section was carried out on the bracelet bead to examine the structure of the pigmentation layer and to find any possible trace of organic substances which could have been used as paint binders. This last research was carried out on both the section, with an istochemical test, as well as on the fragments of the pigmented samples. The substances searched for were proteins, natural resins, saponifiable components (wax, oils and lipids in general). The most important analysis result of all four samples examined, was the identification of natural cinnabar as the red pigment (MONTAGNA, 1993, file 115). Infact, it emerged that the red particles are composed of sulphur and mercury both from the elementary microanalysis and from the X-Ray diffraction which confirmed the presence of cinnabar in the dust that was examined (Fig. 3-4).

Cinnabar, a hydrothermic genetic mineral with low thermal capacity, is the main mineral of mercury (AAVV, 1968:85): it generally forms compact granular masses in veins of a bright red colour (AAVV, 1968:264) and rarely features rhombohedral or prismatic crystals. It is found in various types of encrusted or saturated rocks, near volcano eruptions (Crespi, Liborio, Mottana: scheda 25). Formations of cinnabar in the region of Trento are documented in the Sagron-Vallalta area where a mercury mine used to be active (BACCOS, 1966:717) and in the Daone valley near Malga Bisina (EXEL, 1987: 14). The largest layers of mercury are to be found on Mount Amiata in Tuscany, where strata of cinnabar are presumed to have been exploited since the Prehistoric Age (MOCHI, 1915; GRIFONI CREMONESI, 1989:214-215). Currently, a hypothetical supposition suggests the use of cinnabar on a "Serra" type vase, with traces of a reddish colouring, found on a VBQ Culture site in Gaione (BERNABO BREA *et al.*, 1990:117) where burial rites similar to those of the necropolis of La Vela (TN)<sup>2</sup> have been discovered. It can therefore be confirmed that cinnabar was used during the

Neolithic period as a colouring substance. Because of the scarce information available, the context in which it was used (funereal?) and its provenance still remain uncertain.

Cinnabar is a mineral which is not very stable with regard to chemical and atmospheric agents, especially in presence of alkaline substances, of light and of dampness. In these situations it can change into metacinnabarite, an isomorphous form of black colouring (AAVV :206). This process of using cinnabar pigment for wall painting is retarded by the application of protective wax layers or putting the pigment in an oily binder<sup>3</sup> (COLOMBO, 1995:85).

The stratigraphic analysis has shown a regular, compact and homogeneous layer of red pigmentation, well adherent to the aragonite of the shell (Fig. 5). What is more, is that cinnabar is not the only mineral present, but it has been mixed, almost amalgamated, to calcium carbonate and to clayey minerals, rich in iron anhydrous oxides (a kind of red earth). As expected, the analysis on the organic mixtures has proved negative considering the nature of the deposit in which the tomb was surrounded.

Considering the results of the analysis it can probably be confirmed that the beads had been coloured intentionally: dry colouring may have been applied, perhaps mixing the red cinnabar with some clay which, due to its plastic consistence, allowed a better adherence to the shell. The results of the analysis supply no concrete evidence to confirm the hypothetical use of an organic binder in the colouring.

## NOTES

1 - Up to now, it is not possible to classify the shell as *spondylus*.

2 - A Serra D'Alto type pottery without traces of colouring was found in the grave n. 6 (BAGOLINI, 1990).

3 - Vitruvio, Libro VII de Architettura, Cap. IX.

**SUMMARY** - During the excavation campaigns carried out from 1987 to 1988 at La Vela (Trento) seven graves were discovered attributed to the Square Mouth Culture. Traces of a reddish colour were evident in grave n.3 (which was of a child). This red pigmentation was present on the skull bones, the little bowl in the child's hand, on the necklace and bracelet beads and on the surrounding soil. In order to identify the nature of the colour and the "painting technique" used, four samples were taken from each of the above mentioned objects. The analysis which took place were: X-Ray diffraction (XRD), optic and electron microscopy (SEM) and the elementary microanalysis with electron microprobe (EDS). The most important analysis result of the all the four samples examined was the identification of natural cinnabar as the red pigment. Furthermore, analysis of the stratigraphic section was carried out to examine the structure of the colour. The result showed a regular compact and homogeneous layer where the cinnabar has been mixed with clayey minerals rich of anhydrous iron oxides. The istochemical test was also carried out to search for the organic substances which were probably used as paint binders: the result of all of these analysis proved negative.

**RIASSUNTO** - Le campagne di scavo condotte nel 1987-1988 a La Vela (TN) hanno permesso il recupero di sette sepolture attribuibili alla cultura dei vasi a bocca quadrata. Sono state riscontrate tracce di colorazione rossastra, evidenti nella Tomba n.3 di bambino. Tale pigmentazione si presenta sulle ossa del cranio, nella ciotolina che teneva nella mano, sulle perline della collana e del braccialetto e sul terreno circostante. Per evidenziare la natura del colore e quale fosse la tecnica pittorica utilizzata, sono stati sottoposti ad analisi 4 campioni prelevati da ognuno dei punti sopraindicati. Le analisi eseguite sono state: la diffrazione a raggi X (XRD), la microscopia ottica ed elettronica (SEM) e la microanalisi elementare con microsonda elettronica (EDS). Il risultato analitico più rilevante è costituito dall'identificazione, in tutti i campioni, di cinabro naturale come pigmento rosso. Inoltre sono state fatte delle sezioni stratigrafiche per osservare la struttura del colore. Essa è costituita da uno strato regolare in cui il cinabro risulta mescolato a minerali argillosi ricchi di ferro anidro. Con l'impiego di test istochimici sono state ricercate le sostanze organiche probabilmente usate come leganti per il fissaggio del colore; queste analisi hanno dato tutte esito negativo.

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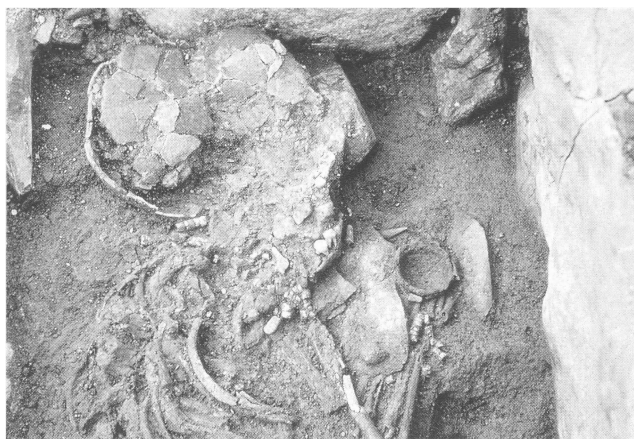


Fig. 1 - La Vela (1987-88). Details of grave n. 3.

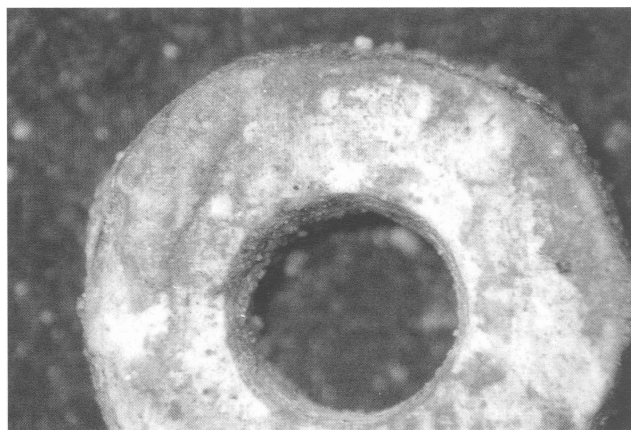


Fig. 2 - La Vela (1987-88). Grave n. 3: details of the layer of red pigment present on the bead. (Optic stereomicroscope enlargement).

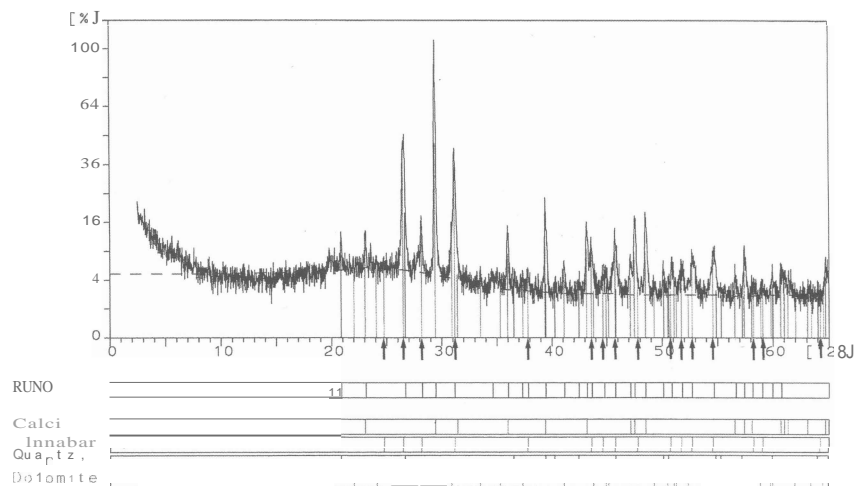


Fig. 3 - La Vela (1987-88). Grave n. 3: X-Ray diffraction of the sample of red soil indicating the presence of calcite and quartz from the soil, cinnabar and traces of dolomite of the shell.

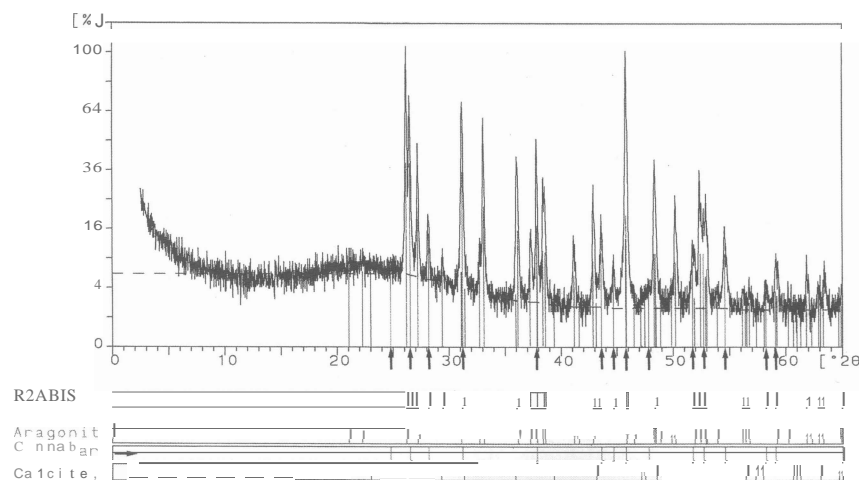


Fig. 4 - La Vela (1987-88). Grave n. 3: X-Ray diffraction of the red pigment of the bead indicating the presence of aragonite, constituent of the shell, cinnabar, traces of calcite from the surrounding ground.

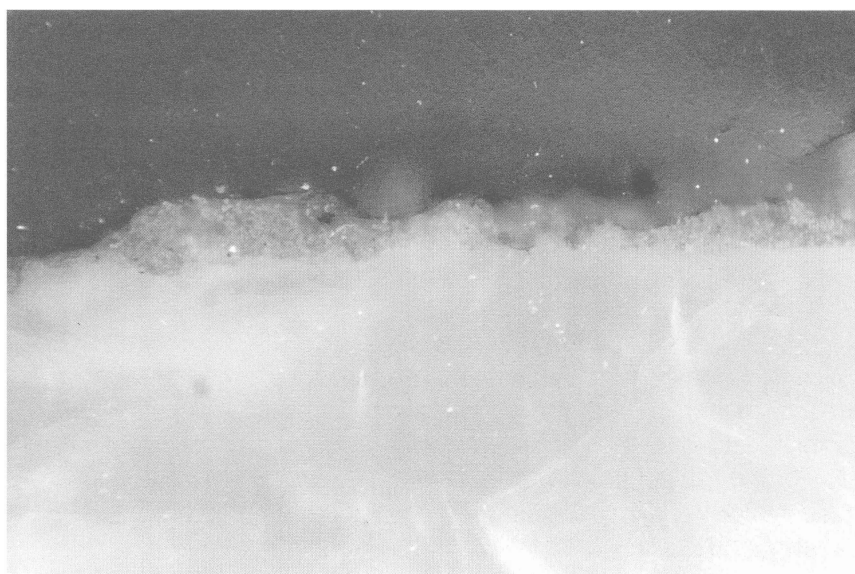


Fig. 5 - La Vela (1987-88). Grave n. 3: shiny section of an external fragment of the bead - (166X) which evidences the layer of red pigment.