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THE DUSTS OF THE HOLY SHROUD
OF TURIN

Progress report on the work of the
Turin Section of STURP

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Work on the Holy Shroud

On October 9th 1978 at night I drew by hand and by forced suction, particles and dusts from the front and the back side of the linen cloth of the Shroud.

All the samples from the back were obtained by suction, and after separating to some extent the Shroud from the supporting cloth.

The separation of the two sheets, was carried out by making clipping of the threads along their perimeter and by cutting some stitches in central areas in such a way to allow the introduction of special tools to keep the cloth layers apart, from suction pipes, and of an optical fibre device for taking pictures of the back.

Such operations were done under sterile conditions as well as for the conservation of the dusts obtained.

The tested areas were five (photo n.1):

- a - Surface of "Recto"
- b - "Verso" area of hands
- c - "Verso" area of face
- d - "Verso" area of feet
- e - "Verso" area of buttocks

Small pieces of wax were drawn from the "Recto", and approx. 2 mgs of dusts and particles from each area of "Verso" subjected to suction. About 80 pictures were taken of the 4 areas of the "Verso" by using fiber optics and about 1000 pictures for recording of the operations (photo n.2). (ph.n.3)

The shrine where the Shroud had been kept was examined in advance, and dust samples were drawn from its interior and from the items that were used to roll up the Shroud and protect it when not exhibited.

Trend of research

The original research programme handed over to the Surveillance Committee established by the Turin religious Authorities was the guideline of my work, which is still in progress.

The large amount of material obtained from the samplings and the subsequent vast amount of observations made, a very limited part though of what can still be done, has initiated further lines of research of substantial interest.

The very wide span of the current research and of its newly emerging lines was constrained by the extensive times of investigation and by the considerable expenditure involved. Even today I can state that the analysis of dusts drawn from the Shroud may still continue several years, perhaps decades, before attaining a full knowledge on the materials concerned.

In any case the lines of research on the Shroud pursued to date are:

- a - Direct optical examination of the "Verso"
- b - Photographic examination of areas on the "Verso"
- c - Microbiological research on dusts
- d - S.E.M. of dusts
- e - Qualitative and semi-quantitative microanalyses of dusts
- f - Examination of comparative dusts, using the same research methods employed on Shroud dusts
- g - Examination of pollutants and /or foreign matter found during the tests
- h - Study of a proposal for a suitable preservation method of the Shroud in the future.

Results and Methods

a) - Direct optical examination of the "Verso"

The "Verso" of the Shroud shows several stains but not the image of the "Recto". This has been ascertained by direct observation using fiber optics introduced between the Shroud and the supporting cloth. This was also confirmed by the exposure of the area at the "Verso" corresponding to the feet that was performed during the last day of work, by further cutting threads at the perimeter of the Shroud, allowing direct observation of a wider area to many of us.

b) - Photographic examination of areas on the "Verso"

Unfortunately, this kind of work did not give the results we hoped for, owing to the extremely difficult focusing of the subject. Nevertheless some stains remained impressed on the film and they allow us to state that in some places of the "Recto" the reddish stains (commonly indicated as "blood") show a perfect correspondence with similar stains on the "Verso", thus indicating that in some places the "blood" has filtered through the cloth until the limit of the opposite surface (photo n.4).

c) - Microbiological research on dusts

The vacuum sucked dusts from the back of the Shroud, and the wax fragments drawn from the "Recto" were tested according to many methods in order to arrive at the "biological picture" of the cloth. Such tests have provided very important elements for the future preservation of the Shroud. They can be summarized as follows:

- Shroud - Presence of very common bacilli and abundant fungi such as:
 - Diplococcus constellatus
 - Diplococcus magnus sive paleopneumoniae and others
 - Mucor genus Rhizopus and others

- Wax - Presence of common bacteria and others, infrequent, such as Streptococcus aureus, Sarcinae and, more unusual, the Fusobacterium necroforum sive mortiferum, dangerous to man.

The same tests were carried out on the samples from the shrine and gave evidence of abundant fungi and bacilli of many kinds.

d) - S.E.M. of dusts

This type of research has provided the greatest number of observations and data and on this very research I concentrated most of my energy, time and personal expenditure.

Owing to the large quantity of samples obtained a non systematic research was developed at random for every group of dusts that were drawn. The items of major interest are:

Pollens - They are frequent and abundant; some are recent and others ancient. New or recent pollen is clean. Pollen which I have placed in Turinese tap water for one week is covered with a layer-primarily of calcium as determined by electron microprobe. The last historical use of water on the Shroud was 1532 at the time of the fire, presumably the first use was during the retting process at the time the linen was fabricated. The oldest ones cannot be classified in the conditions they were drawn as they are coated by other substances (photo n.5).

A notable exception among many I examined was a fossil pollen of the genus Lycopodium which most likely can be traced to the Cretaceous period.

To avoid irretrievable damage to other items I never tried to clean the oldest pollens. Special attention was paid to the possible finding of pollen from Saponaria officinalis, but until now no trace of such pollen, even blurred by coatings, or anything similar by shape and dimensions has been detected.

Insects-From the beginning of research it appeared, rather-surprisingly, a large number of very tiny insects exists on the back surface of the Shroud. The technical preparation of the samples do not permit us to say that such insects still exist today but we can certainly maintain that in the past they have invaded the surface, may be since the manufacturing of the cloth.

Comparative research on dusts drawn from Egyptian mummies of an earlier Period than Jesus Christ have provided very similar insects at the S.E.M., superimposable in some cases. Their classification is very difficult. Such mites, according to the Institute of Systematic Zoology of the University of Turin, are at least 10 times smaller than those they are familiar with (photo n. 6).

Other kinds of tiny insects, whole or in parts, observed both in Shroud and Egyptian dusts seem/even more difficult to classify.

Mineral in general - Mineral dusts represent the bulk of the materials drawn. In some instance their crystal aspect identifies them, but in most cases their uneven shape does not permit any assumption.

e) - Qualitative and semi-quantitative microanalyses of dusts

In parallel with S.E.M. analyses, we carried out a number of qualitative and sometimes semi-quantitative microanalyses, employing a X-ray fluorescence and electron microprobe.

The most interesting findings are related to the areas of the hand and the face. In these areas (but not only there) many particles mostly made of light elements were observed. The prevailing chemical elements were Si, Na, Al, P, S, Cl, K and Ca which is the most abundant. Fe, Cu, Ag, Pb and Au (this last one for technical reasons) were not frequent.

In the above connection we can say that the light elements are often linked together in complex and numerous combinations that can suggest the abundance of various acid carbonates.

Among the heavy elements Fe is prevalent and in the samples examined it shows two possible kinds of combination suggesting, in the qualitative analyses, the presence of organic and inorganic Fe.

There are particles of iron oxide on the cloth which are pure iron oxide. In 1979, using a highly purified iron oxide obtained from lens polishers, the two types of pure iron oxide were indistinguishable.

Then there is Fe linked to light elements such as K, Ca, Na and others, that seems to be of organic origin probably blood or its derivatives (photo n. 8).(photo n. 8bis).

f) - Examination of comparative dusts, using same research methods employed on Shroud dusts

After some unsuccessful attempts on dusts from fabrics of difficult comparison, the analysis of dusts from Egyptian mummies of a period around 1100 B.C. has provided the best and perhaps most surprising results. In fact the dusts drawn on the skin of mummies, beneath the innermost layer of bandages, show a considerable similarity in our microanalyses with most of the microanalyses made on Shroud dusts. Moreover, important biological similarities were also noticed, such as for instance between pollen incrustations and the similar aspect of bits of tiny insects found in both cases (Photo n.9-9bis-9ter).

g) - Examination of pollutants and/or foreign matters found during the tests

Several items whose shape and analysis were not well definable have led to the investigation of substances related to the current and ever increasing atmospheric pollution.

Frequently some particles have been recognized as hydrocarbon combustion derivatives, originating to a large extent from central heating in the Turin area (photo n.10).

Other pollutants are related to the presence in the atmosphere of commercial detergents. It has also been found that articles which came in contact with the Shroud, such as e.g. "ex voto", sacred vestments and painted copies of the Shroud have transferred traces of their constituents on to it. In fact extremely small particles of Au, Ag, bronze, candle wax, shreds of different fabrics and so forth, have been detected.

h) - Study of a proposal for a suitable preservation method of the Shroud in the future

The information gained from the various aspects of the research made is such as to provide useful indications for a suitable preservation method of this important document of Christendom, property of the whole mankind, and silent witness of an immense suffering.

The study of the proposal is under way in collaboration with James Druzik of Los Angeles, California. The present idea is based on the realization of a air tight container filled with inert gases.

Conclusions

The results of the research described open the way to a new hypothesis on the events related by the Gospels.

The Man of the Shroud was prepared for burial along the Jewish tradition strongly influenced by the Egyptian civilization of that time.

Once dead, the prominent people of eastern Mediterranean as for instance the Egyptians and Copts, were subjected to an embalming process consisting in a dehydration treatment by coating the corpse with Natron, a substance brought from Egyptian mines (e.g. Ostrakina) whose chemical composition seems to be very close to plenty of Shroud dust particles examined at the S.E.M. A significant confirmation of this hypothesis may consist in the presence of insects of very similar nature, that are present both on the Shroud and Egyptian mummies, as well as the likeness of the respective pollens found on them.

Along this hypothesis, the Gospel narrative, whereby the pious men carried to the grave about 30 kilos of materials for treatment of the corpse, seems reasonable and acceptable.

If aloes myrrh and other spices were employed, they must have been so in a limited way and certainly not in such large quantity, that could not be economically justified. It seems reasonable to think, instead, that such substances may have been mixed to the wet or dry dehydrating powder that represented the burden carried by the pious women. Lastly, a modest quantity of spices may explain the fact that to date no particle of such kind has been identified in the dusts examined.

I believe the above hypothesis may also support the formulation of a new theory on the formation of the image on the Shroud, on which we are at present elaborating.

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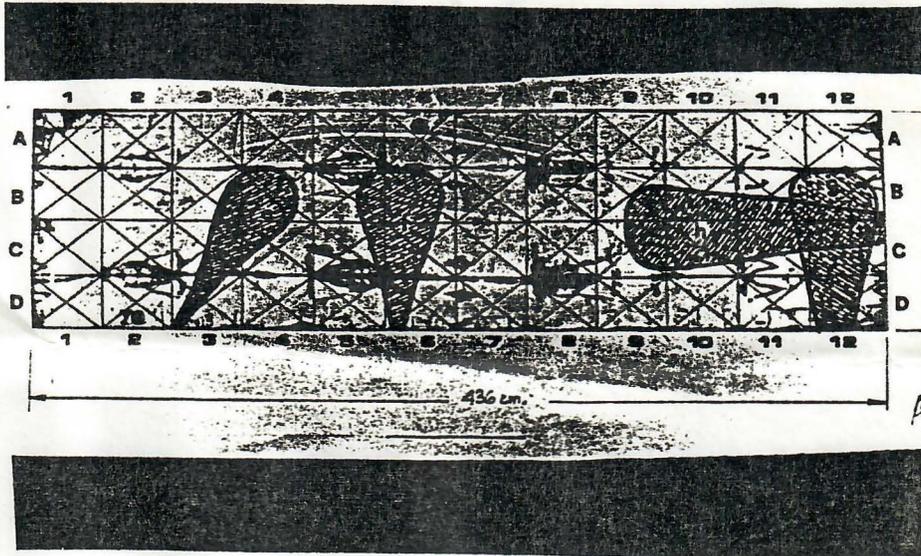


Photo n° 1

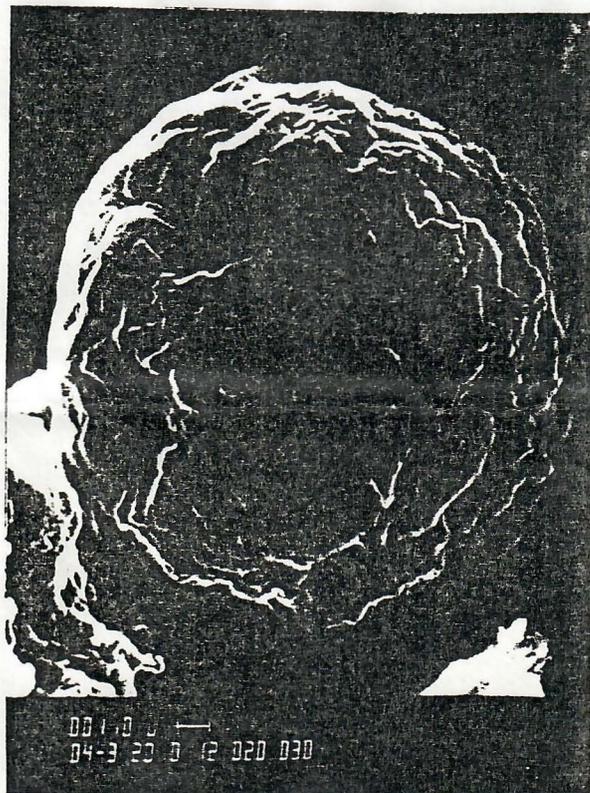


Photo n° 5

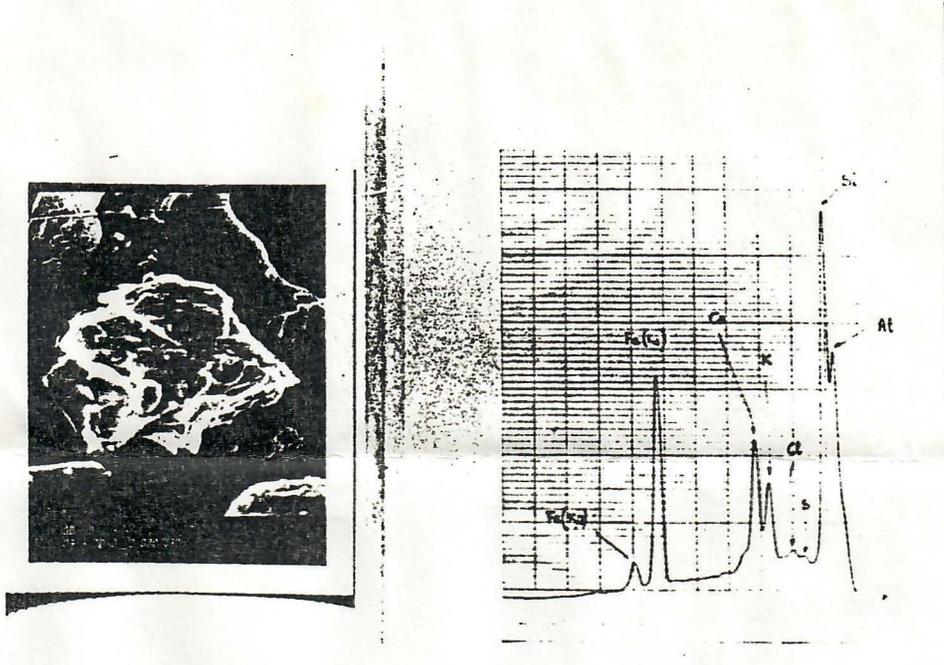


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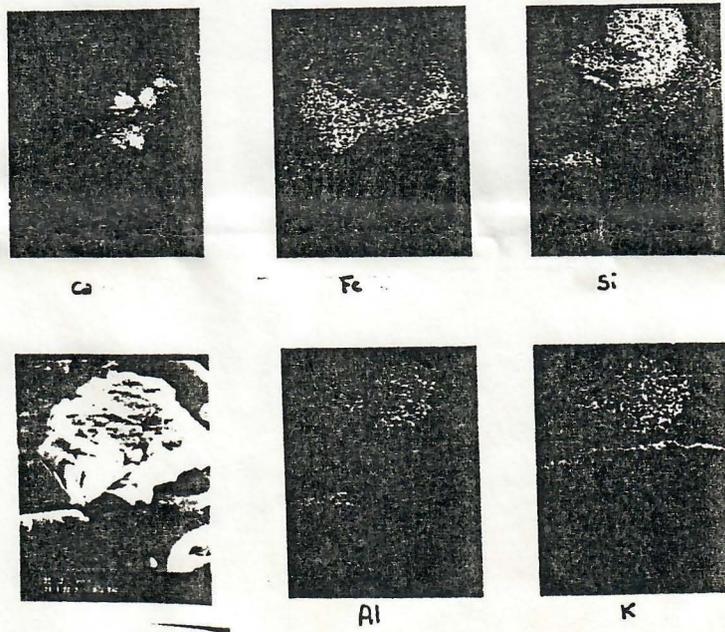


Photo n° 8 bis

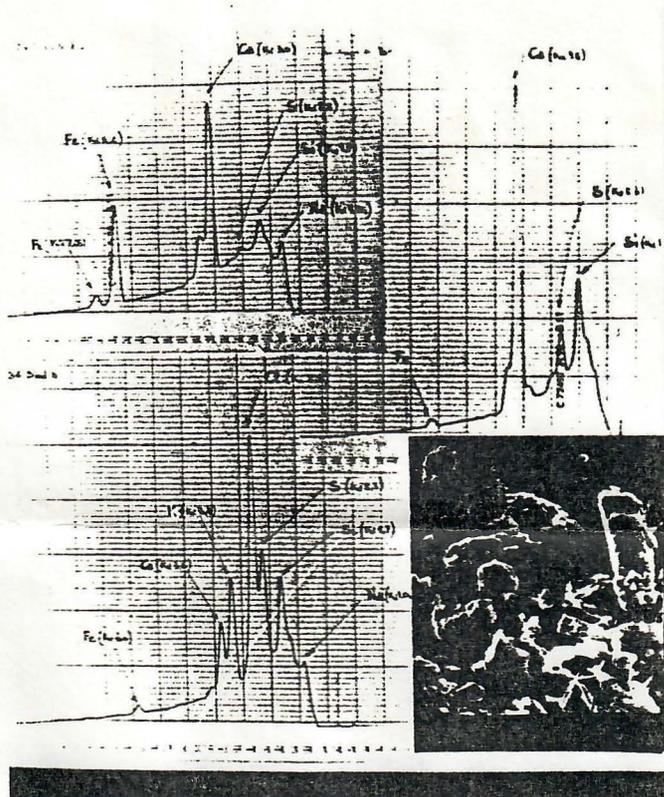


Photo n° 9

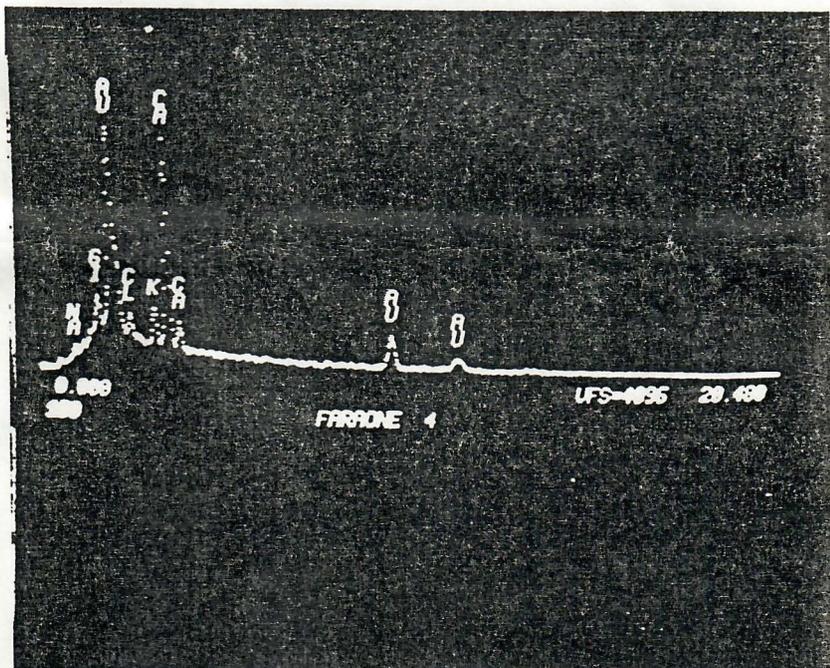


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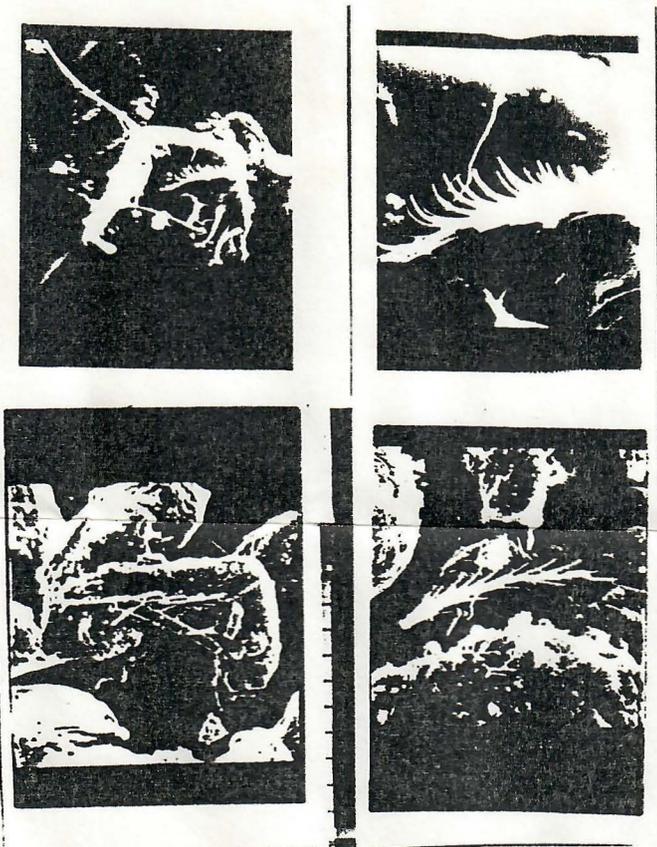


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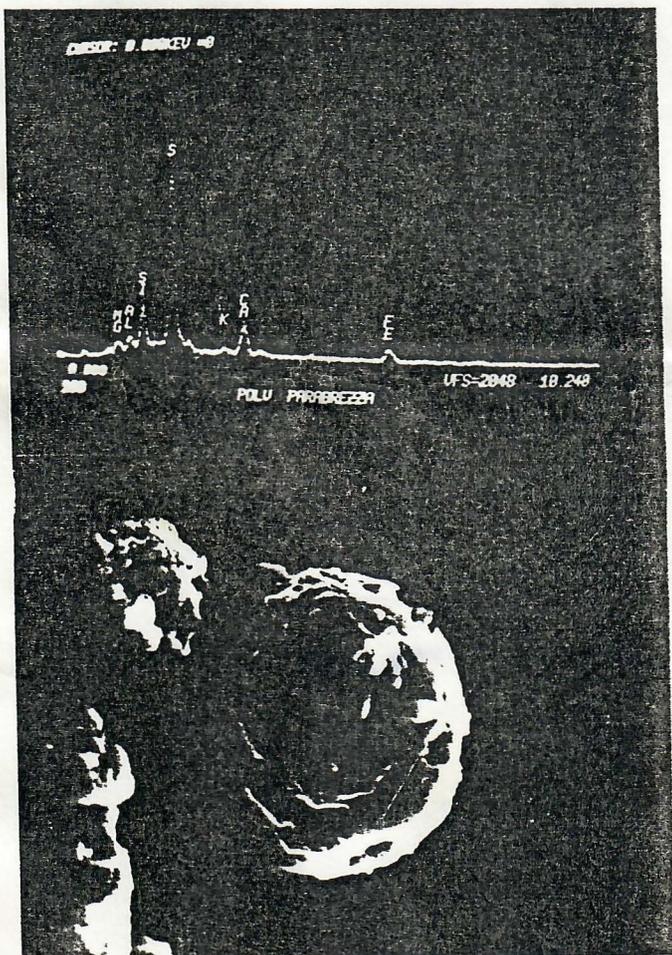


Photo n° 10