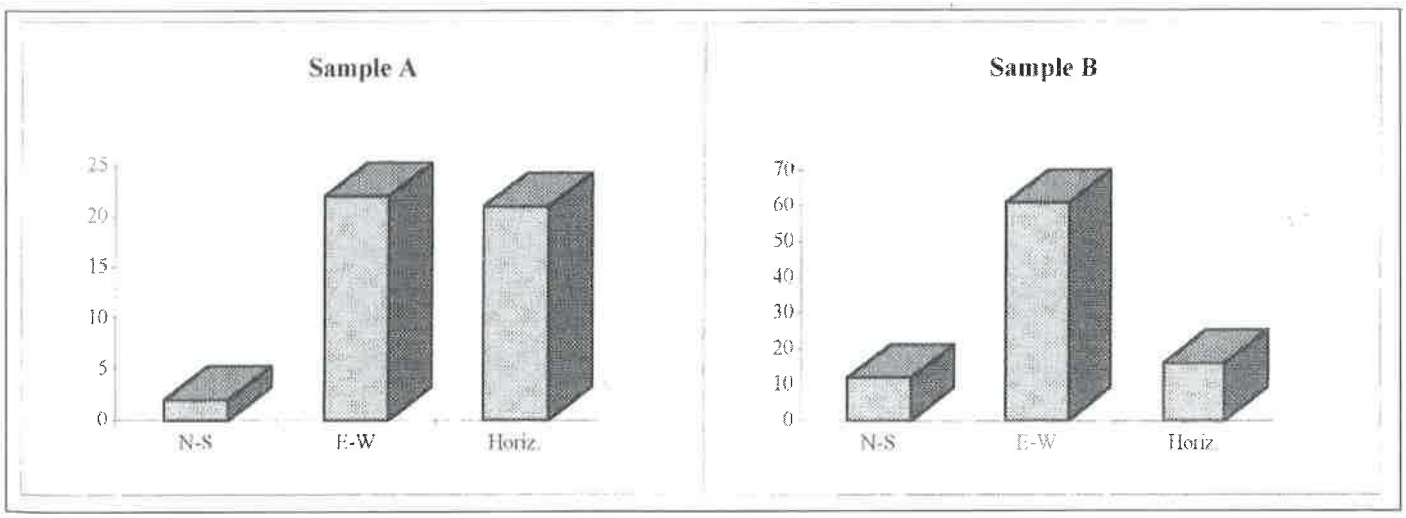
Fabrics as pollen traps: some observations

Marta Mariotti LIPPI

Departement of vegetal biology - University of Firenze Italy.

The results of the palynological analyses published by Frei (1979-1983) have constituted the only available information which has been obtained directly from the Shroud of Turin, except for that by Maloney (1990). There have been many objections raised regarding Frei's work, especially from a methodological point of view. For the time being, it may be more useful to improve our understanding of the results already known about the Shroud, itself, instead of beginning new studies.

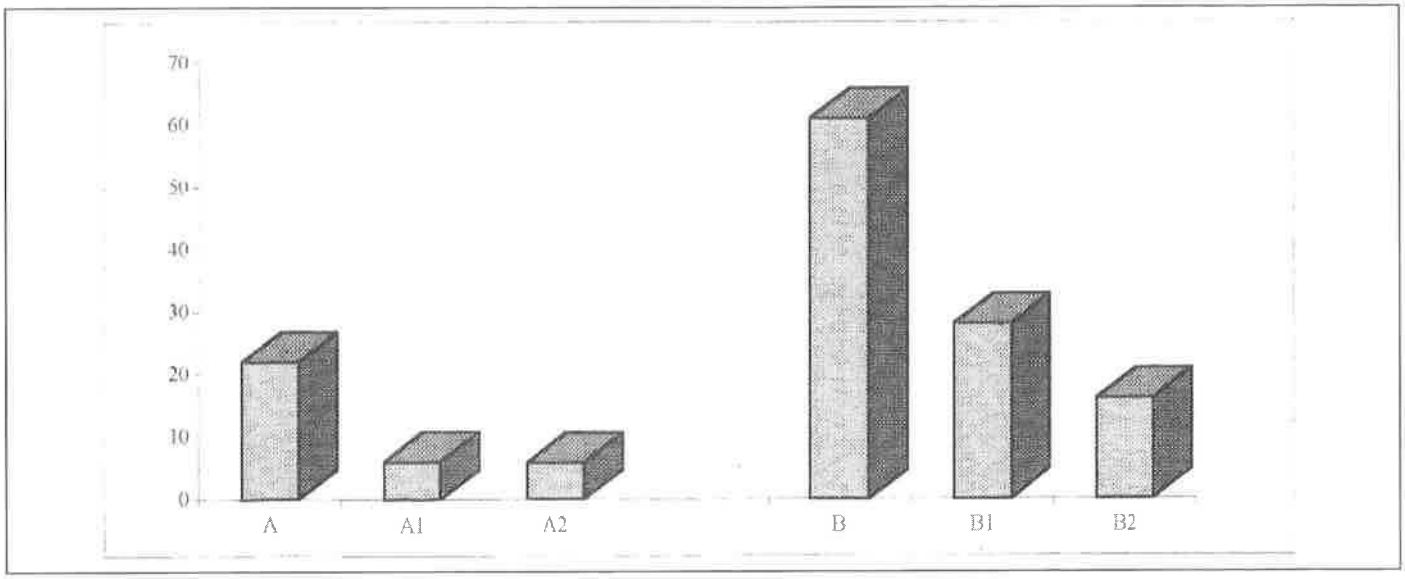
In this light, the present contribution proposes to improve our knowledge of the pollen content of the material, or, more precisely, the ability of the fabric to trap and hold pollen grains. For this purpose, we exposed textile fragments to the air and then subjected them to palynological analyses. The textile chosen for the experiment was a herring-bone linen, very similar to that of the Holy Shroud (sample A). Prior to the experiment, part of the sample was immersed for 15 minutes in a watery suspension of aloe (34%) and myrrh (6%) (sample B). This treatment was supervised by Prof. Mario Moroni, who also provided the material. Samples of the material (samples A and B), which measured 30x30 centimeters, were exposed to the air in an olive-yard in Malmantile (Lastra a Signa, near Florence, Italy). They were sheltered under a cover and placed vertically at different cardinal orientations (North-South, East-West), and horizontally. The duration of the air-exposure (4/30/94-6/11/94) included the entire period of the olive-tree blooming in Tuscany. The choice of the location was dictated by the desire to verify the air-diffusion of the olive pollen, which, as we know, was not found by Frei, despite the wide diffusion of olive-trees in many of the areas where the Shroud has been kept. At the end of the exposure, we carried out palynological analyses on fabric fragments measuring cm^2 20 (cm^2 40 if we consider both sides). It may be pointed out that initially, i.e. before air-exposure, the material did not contain any pollen grains, and that in the aloe and myrrh we found very few grains, morphologically quite discernible from those of the plants in the olive-yard.



Grains/cm2 on the fabric surface after the exposure with different orientation in the olive-yard.

Even though it is possible to remove pollen grains from fabric simply by immersion in water, for palynological analysis the fabric samples were boiled in a 10% NaOH water solution for 15 minutes. The residue containing the grains, after being washed in hot water, was placed in water and glycerin 50% and observed under light microscope.

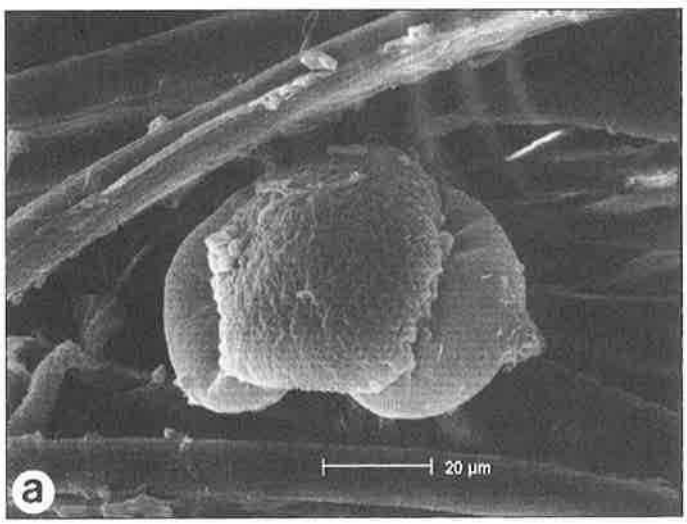
The test determined that, from a quantitative point of view, the sample treated with aloe and myrrh (sample B) had a greater capacity than the non treated fabric (sample A) to trap and hold pollen under vertical exposure (Fig.1). The difference in pollen quantity among the samples exposed to different orientations most likely depended on the direc-



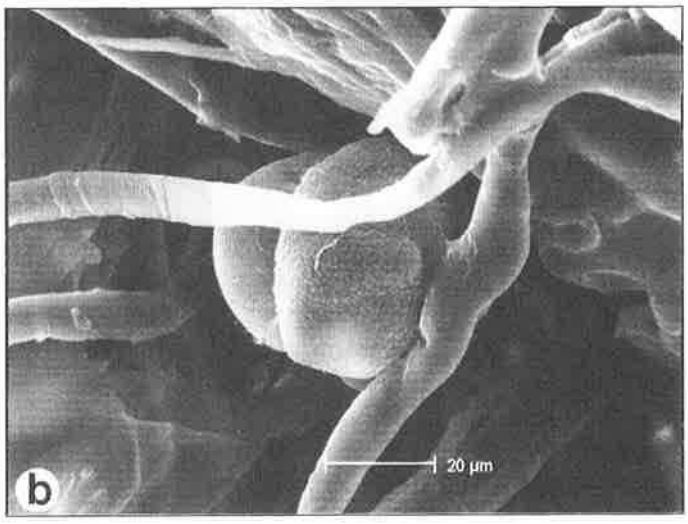
Grains/cm2 on the fabric surface-orientation E-W-after the exposure in the olive-yard and after the hanging in a closed room

tion of the winds. Concerning the quality of the grains, on the other hand, we observed that the list of morphotypes identified on the sample treated with aloe and myrrh was richer than that of the non treated material, with a multiplicative factor varying from 1.5 in the E-W orientation to 2.5 in the N-S orientation. Finally, the quantity of grains in the samples exposed horizontally was similar in both samples (A and B). Olive pollen was always abundant.

Later, the samples of material which had hung in the olive-yard with an E-W orientation, and which contained the highest quantity of pollen grains (Fig. 1; Fig.2: samples A and B), were also hung in a tightly closed room, far from drafts. The absence of air-diffused pollen grains in the room was controlled with other samples. After two months, the quantity of pollen detected on the samples had greatly decreased (Fig 2: samples Al and Bl). It must be noted that all the types of grains decreased in number, in a totally unpredictable and apparently random manner. A further, brief new permanence in the same controlled environment verified the possibility that more pollen can be lost (Fig.2: samples A2 and B2). The results showed that the second pollen decrease was minimal in sample A, and significant in sample B.



Pine pollen grain on the thread surface.

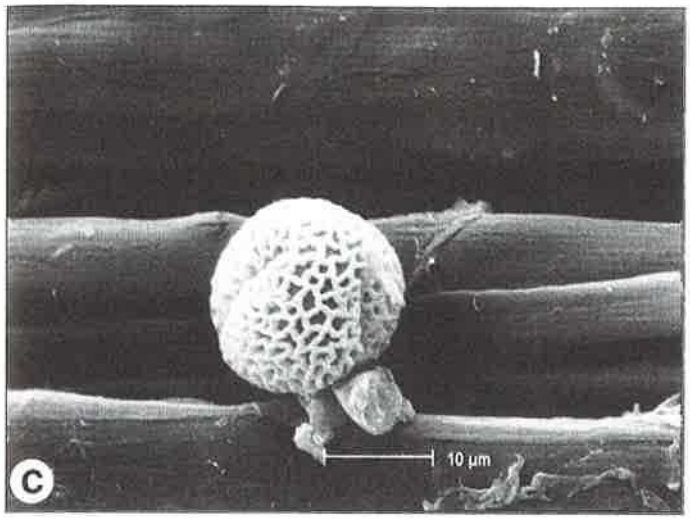


Pine pollen grain among the fibers of a thread.

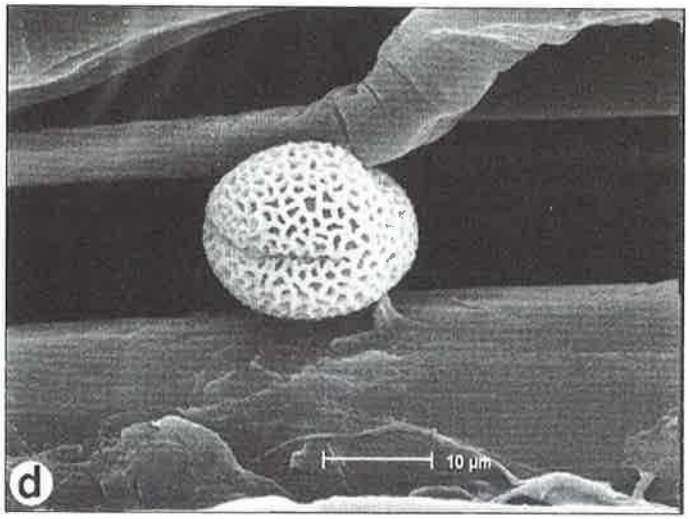
At the same time, we observed the fabric samples under scanning electron microscope (SEM), after gold coating. This test evidenced that some of the pollen grains simply adhered to the fabric surface, while others were trapped among the fibers of the thread (Table 1). At this point, it seemed helpful to verify how much of the pollen which had been found among the fibers, could be removed with an adhesive tape.

As we applied the tape to the fabric, we exerted a 15-second pressure of 10N/cm^2. Then, we examined how many pollen grains had adhered to the tape, and, conversely, how many were left in the fabric. We could thus ascertain that

the pollen was almost completely removed from the fabric, sticking to the adhesive substance on the tape. When we repeated the operation on the upper surface of the samples treated with aloe and myrrh and exposed horizontally in the olive-yard, we noticed that the grains removed from the fabric were twice as many as those that had been left in it; these latter grains had accumulated on the lower surface.



Olive pollen grain on the thread surface.



Olive pollen grain among the fibers of a thread.

This work thus emphasized the notable capacity of this type of fabric to entrap pollen, especially after the aloe/myrrh treatment. This treatment appears to render the fabric surface somewhat sticky to the pollen. The same work also showed how pollen, once trapped, is largely lost by simple vertical exposure, even when protected from drafts. Lastly, large amounts of the pollen were easily removed by means of adhesive tape.

As far as the Holy Shroud is concerned, we can surmise that it had trapped pollen grains from all the places it has been, or at least from all the locations where it has been and is exhibited, as was noticed by Frei (1983). The quantity of collected grains varies depending on too many factors to be even remotely estimated. However, the above mentioned tests indicate that the quantity of pollen that can be trapped and held by that particular type of fabric is not negligible, especially after treatment with aloe and myrrh.

On the other hand, it was evidenced that a great part of the same pollen can be lost. Therefore, it is unthinkable that, after all its vicissitudes, the Shroud itself would not have lost much of it.

If at this point we ask : «what can be expected from palynological analyses on the Shroud?». The answer must be: we can **still** find some definite traces of each location where the Shroud has been. This might offer some proof that the Lirey-Chambery-Turin Shroud is the same one which had been in Jerusalem, in Edessa and then in Constantinople. Therefore, it is necessary to individuate those grains which belonged to plants which have grown exclusively in the areas around the about mentioned cities. These may represent the markers of those well defined geographical areas.

Gomez Ferreras (1996) is currently working on a similar project, on the «Sudario de Oviedo». She has identified pollen grains belonging to genera including species endemic to ancient Palestine on this Sudario.

Frei's lists (1979-1983) contain some species of plants that are widespread in the Mediterranean Basin area. In the same lists, other plants are found which grow and might have grown in limited geographical areas of the Middle-East. However, these areas are too wide to pin-point and confirm the exact location where the Shroud has been historically known to be kept. In any case, the fact that the Shroud has been shown to contain not only pollen from Europe, but also from the Middle-East should be deemed information of great value and reliability. If more detailed results than those reported by Frei are to be found, the task is indeed difficult, at least with the use of contemporary technology. So, in answer to those who sustain the necessity of analyses ex-novo, I would like to propose the following: wait for a larger body of knowledge and, above all, new technology before carrying out new tests on the Shroud which may risk compromising the integrity of the Shroud for future analyses.

For the time being it seems more useful to safeguard the Shroud from new traumas which could possibly deplete, even further, definite information, palynological and not, which it can offer. ■

References

Gómez Ferreras C. , 1996. El Sudario de Oviedo y la palinología. In: *Sudario del Señior* Actas del I Congr. Intern. sobre el Sudario de Oviedo. Oviedo 1995: 83-90.

Frei M., 1979. Il passato della Sindone alla luce della palinologia. In: *La Sindone e la scienza*. Atti del II Congr. Intern. Sindonologia. Torino 1978: 191-200.

Frei Sulzer M., 1983. Identificazione e classificazione dei nuovi pollini della Sindone. In: *La sindone. Scienza e fede*. Atti II Congresso Nazionale di Studi sulla Sindone. Bologna 1981: 279-284.

Maloney P.C., 1990. The Current Status of Pollen Research and Prospects for the Future. In *The Assist Newsletter* 2 (l): 1-7.

Les tissus comme piège à pollens : quelques observations

Le but du travail était de déterminer la capacité d'un tissu à piéger et à retenir des grains de pollens d'olivier pour comprendre pourquoi Max Frei n'a pas trouvé ce pollen sur le Linceul de Turin, malgré la large présence de cet arbuste dans plusieurs lieux où le Linceul a pu se trouver.

Le tissu de lin en chevron a été exposé à l'air dans une oliveraie pendant toute la période de floraison puis soumis à des analyses palynologiques. Simultanément un échantillon préalablement immergé dans une suspension aqueuse d'aloès et de myrrhe était soumis au même traitement. Le lin présentait une capacité notable à piéger le pollen, surtout après le traitement aloès/myrrhe. Puis le pollen est en grande partie perdu par simple exposition verticale même à l'abri des courants d'air. Il est donc impensable que le Linceul, après toutes les vicissitudes qu'il a subies, n'ait pas perdu beaucoup de ses pollens.

L'auteur conclut qu'il est préférable d'attendre de nouveaux progrès scientifiques et surtout technologiques avant de procéder à de nouveaux tests sur le Linceul qui peuvent risquer de compromettre son intégrité en vue de nouvelles analyses. Pour le moment, il semble plus utile de préserver le Linceul de nouveaux traumatismes qui pourraient encore diminuer les informations palynologiques ou autres qu'il peut offrir.