

9. EXPERIMENTAL INVESTIGATIONS ON THE POLLEN GRAINS OF PUNICA GRANATUM L.

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Abstract

Pollen grains isolated from buds and flowers were investigated with the following methods: 1. High temperature effect at 200 °C during 60 s, 5 and 10 hours. 2. Hydration at 30 °C during 24 hours. The P/E ratio and the length polar axis were investigated quantitatively. The results of the experiments are compared with the data of the dry fresh pollen grains.

Key words: Experimental Palynology, recent, *Punica granatum*, LM.

Introduction

Punica granatum L. is an important species in the Mediterranean Regions (SOÓ and JÁVORKA, 1951, LAGOS, 1997, etc.). There are several publications concerning the pollen morphology of this species (ERDTMAN, 1952, THANIKAIMONI, 1972, 1973, 1976, 1980, 1986, TISSOT, 1990, TISSOT and VAN DER HAM, 1994). The family or the genus was represented in the Tertiary of the Northern Hemisphere (cf. POTONIÉ, 1934, POTONIÉ and VENITZ, 1934, KEDVES, 1978). Because of the interesting flower morphology we have chosen this species also for experimental palynological investigation.

The aim of our contribution is to compare the LM morphology of the mature and immature pollen grains in different conditions.

Materials and Methods

The pollen material for investigations was collected by Dr. M. KEDVES on the 26th April 1999 in Sousse Tunisia during the 4th Symposium of African Palynology.

The experiments are as follows:

T-9-31. - dry immature pollen grains.

T-9-32. - immature pollen grains hydrated at 30 °C during 24 hours.

T-9-33. - immature pollen grains heated at 200 °C during 1 hour.

T-9-34. - immature pollen grains heated at 200 °C during 5 hours.

T-9-35. - immature pollen grains heated at 200 °C during 10 hours.

T-9-36. - dry mature pollen grains.

T-9-37. - mature pollen grains hydrated at 30 °C during 24 hours.

- T-9-38. - mature pollen grains heated at 200 °C during 1 hour.
 T-9-39. - mature pollen grains heated at 200 °C during 5 hours.
 T-9-40. - mature pollen grains heated at 200 °C during 10 hours.
 The pollen grains were mounted in glycerine-jelly hydrated at 39.6%.

Results

Qualitative data

Immature pollen grains. - in dry condition amb is more or less globular (Plate 9.1., fig. 1), some hydrated forms in polar position are superficially similar to the *Interporo-pollenites* fossil fgen. which are characteristic for the Senonian sediments in the *Norma-polles* Region (Plate 9.1., figs. 2,3).

Mature pollen grains. - in dry condition the tricolporate longaxones characteristic features are well shown (Plate 9.1., figs. 6,7). The hydrated forms (Plate 9.1., figs. 8-13) are similar to the immature pollen grains (Plate 9.1., figs. 1-5).

It is interesting that the more or less isodiametric form of the immature pollen grains after heating have not altered in a significant measure (Plate 9.1., figs. 14-16, plate 9.2., figs. 4-7, plate 9.1., figs. 20-22, plate 9.3., figs. 1-3, plate 9.1., figs. 26-28, plate 9.3., figs. 6-8).

Regarding the mature pollen grains we have not observed important alterations in the symmetry after heating (Plate 9.1., figs. 17-19, plate 9.2., figs. 8-10, plate 9.1., figs. 23-25, plate 9.3., figs. 4,5, plate 9.1., figs. 29-31, plate 9.3., figs. 9-12). It is worth of mentioning that the structure of the apertural area after heating is well shown.

Quantitative data

Explications: D = dry, H = hydrated.

1. Immature pollen grains isolated from buds (Plate 9.1., figs. 1-5; fig. 1 D, figs. 2-5 H, plate 9.2., fig. 1 H).

1.1. P/E ratio (D) from 1.0 until 1.3, maxima: 1.0 (31.0%), 1.07 (27.0%) average: 1.07.

1.2. P/E ratio (H) from 1.0 until 1.4, maximum: 1.0 (42.5%), average: 1.05.

1.3. Polar axis (D) from 17.5 until 25.0 μm , maximum: 20.0 μm (45.0%), average: 19.9 μm .

1.4. Polar axis (H) from 17.5 until 25.0 μm , maximum: 20.0 μm (43.0%), average: 21.0 μm .

2. Mature pollen grains (Plate 9.1., figs. 6-13; figs. 6,7 D, figs. 8-13 H, plate 9.2., figs. 2,3 H).

2.1. P/E ratio (D) from 1.4 until 2.0, maxima: 1.6 (34.0%), 1.7 (31.0%), average: 1.66.

2.2. P/E ratio (H) from 1.0 until 1.13, maximum: 1.0 (53.0%), average: 1.04.

2.3. Polar axis (D) from 25.0 until 32.5 μm , maximum: 30.0 μm (40.0%), average: 29.5 μm .

2.4. Polar axis (H) from 20.0 until 25.0 μm , maximum: 22.5 μm (54.0%), average: 22.0 μm .

3. The per cents of the position of the heated pollen grains are as follows.

3.1. Immature pollen grains (Plate 9.1., figs. 14-16, 20-22, 26-28, plate 9.2., figs. 4-7, plate 9.3., figs. 1-3, 6-8).

| duration of heating | position polar | position equatorial |
|---------------------|----------------|---------------------|
| 1 hour | 34.0% | 66.0% |
| 5 hours | 37.5% | 62.5% |
| 10 hours | 23.0% | 77.0% |

3.2. Mature pollen grains (Plate 9.1., figs. 17-19, 23-25, 29-31, plate 9.2., figs. 8-10, plate 9.3., figs. 4,5, 9-12.)

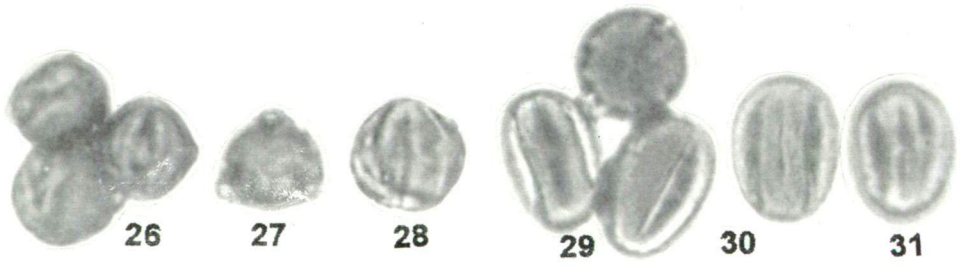
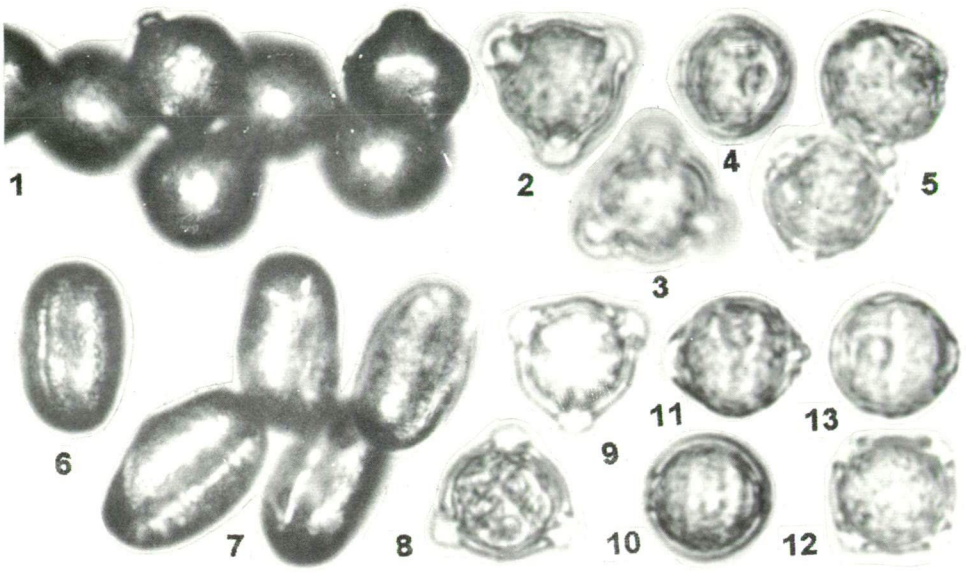


Plate 9.1.

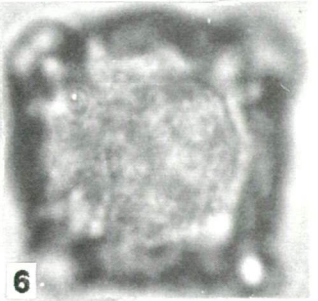
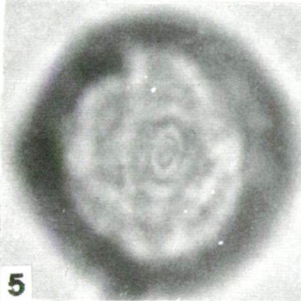
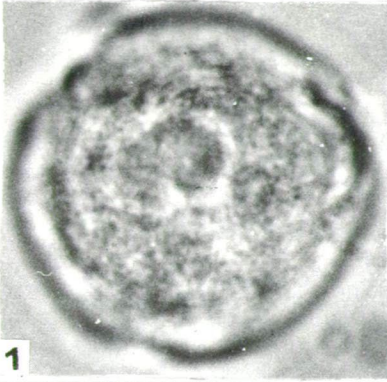


Plate 9.2.

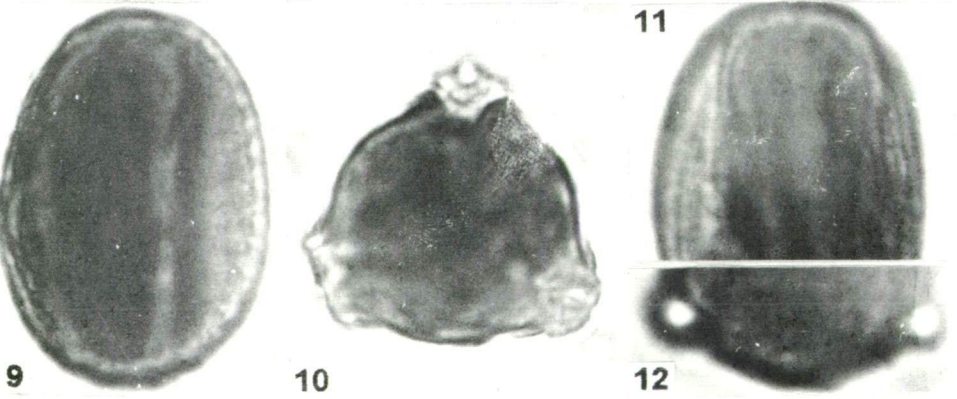
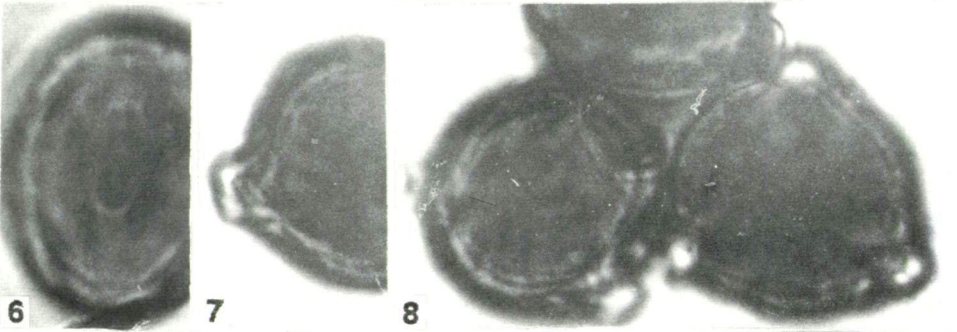
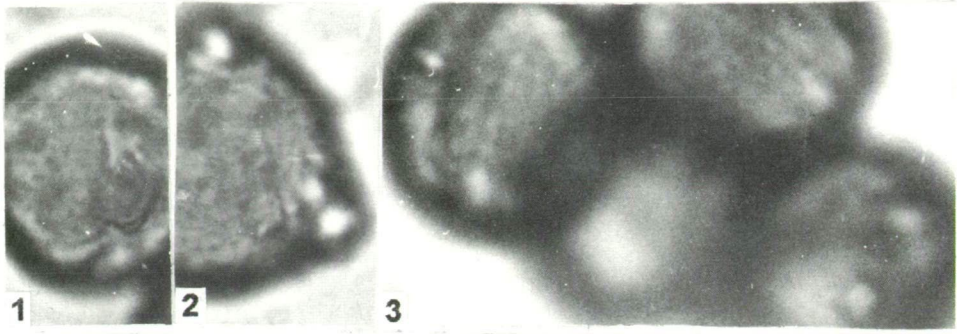


Plate 9.3.

| duration of heating | position polar | position equatorial |
|---------------------|----------------|---------------------|
| 1 hour | 21.5% | 78.5% |
| 5 hours | 20.0% | 80.0% |
| 10 hours | 17.5% | 82.5% |

Discussion and Conclusions

Based on our new results we can emphasize the following:

1. The similarity to the early (Upper Cretaceous) *Interporopollenites* fgen. of the hydrated immature pollen grains.
2. The similarity in the symmetry of the dry and hydrated immature and the mature hydrated pollen grains.
3. The constancy of the symmetry of the pollen grains after heating.

Plate 9.1.

1-31. *Punica granatum* L., light microscopic pictures. Magnification of all pictures: 1000x.

1. Dry pollen grains isolated from buds.
- 2-5. Hydrated pollen grains isolated from buds.
- 6-7. Dry, mature pollen grains.
- 8-13. Hydrated mature pollen grains.
- 14-16. Pollen grains isolated from buds, heated during 1 hour at 200 °C.
- 17-19. Mature pollen grains heated during 1 hour at 200 °C.
- 20-22. Pollen grains isolated from buds, heated during 5 hours at 200 °C.
- 23-25. Mature pollen grains heated during 5 hour at 200 °C.
- 26-28. Pollen grains isolated from buds, heated during 10 hours at 200 °C.
- 29-31. Mature pollen grains heated during 10 hour at 200 °C.

Plate 9.2.

1-10. *Punica granatum* L., light microscopic pictures. Magnification of all pictures: 2500x.

1. Hydrated pollen grains isolated from buds.
- 2,3. Hydrated pollen grains isolated from flowers.
- 4-7. Pollen grains isolated from buds, heated during 1 hour at 200 °C.
- 8-10. Mature pollen grains heated during 1 hour at 200 °C.

Plate 9.3.

1-12. *Punica granatum* L., light microscopic pictures. Magnification of all pictures: 2500x.

- 1-3. Pollen grains isolated from buds, heated during 5 hour at 200 °C.
- 4,5. Mature pollen grains heated during 5 hour at 200 °C.
- 6-8. Pollen grains isolated from buds, heated during 10 hour at 200 °C.
- 9-12. Mature pollen grains heated during 10 hour at 200 °C.

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