10. EXPERIMENTAL STUDIES ON THE POLLEN GRAINS OF ELAEAGNUS ANGUSTIFOLIA L.

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Abstract

LM morphological alterations were investigated by the high temperature effect on 200 °C, during 10 minutes, 1 hour, 5 hours, 10 hours, and after partial dissolution with 2-aminoethanol during different length of time. The qualitative and the quantitative variations of the maximum size of the pollen grains were investigated and evaluated.

Key words: Palynology, recent, *Elaeagnus angustifolia*, LM, high tempertaure effect.

Introduction

The LM morphology of the pollen grains of *Elaeagnus angustifolia* is of an early type within the *angiosperms*. Short colpi represent the exoaperture, and triangular amb in polar view. Previously non-acetolyzed and acetolyzed pollen grains were investigated with the LM, TEM and SEM methods isolated from buds and open flowers (KEDVES and PÁRDUTZ, 1982). It was established, that the acetolysis considerably changed the size of the pollen grains. Based on the TEM results it was pointed out, that pollen grains of *Elaeagnus angustifolia* may be regarded the morphological analogies of *Complexiopollis* KRUTZSCH 1959 emend. TSCHUDY 1973, without supposing direct botanical relationship between the two. Later it was established that the pollen grains of this species are resistant against X-ray irradiation (KEDVES and KÁROSSY, 1998). Surprising results were published by KEDVES and Erika HORVÁTH (2000) namely, the sporopollenin of the ectexine is less resistant as it is easily dissolved or degraded with organic solvents.

The aim of this contribution is to investigate the alterations of the LM morphology during the high tempertaure effect and the partial dissolution in 2-aminoethanol, including the quantitative characteristic features.

Materials and Methods

1. The pollen material was collected on the 10th April 1999.

Experiment No.: T9-P-19. - 20 stamen + 2 ml 2-aminoethanol, temperature 30 °C, length of time: 5 minutes.

Experiment No.: T9-P-20. - 20 stamen + 2 ml 2-aminoethanol, temperature 30 °C, length of time: 10 minutes.

Experiment No.: T9-P-21. - 20 stamen + 2 ml 2-aminoethanol, temperature 30 °C, length of time: 15 minutes.

Experiment No.: T9-P-22. - 20 stamen + 2 ml 2-aminoethanol, temperature 30 °C, length of time: 20 minutes.

Experiment No.: T9-P-23. - 20 stamen + 2 ml 2-aminoethanol, temperature 30 °C, length of time: 25 minutes.

Experiment No.: T9-P-24. - 20 stamen + 2 ml 2-aminoethanol, temperature 30 °C, length of time: 30 minutes.

Experiment No.: T9-P-25. - 20 stamen + 2 ml 2-aminoethanol, temperature 30 °C, length of time: 35 minutes.

Experiment No.: T9-P-26. - 20 stamen + 2 ml 2-aminoethanol, temperature 30 °C, length of time: 40 minutes.

Experiment No.: T9-P-27. - 20 stamen + 2 ml 2-aminoethanol, temperature 30 °C, length of time: 45 minutes.

Experiment No.: T9-P-28. - 20 stamen + 2 ml 2-aminoethanol, temperature 30 °C, length of time: 50 minutes.

Experiment No.: T9-P-29. - 20 stamen + 2 ml 2-aminoethanol, temperature 30 °C, length of time: 55 minutes.

Experiment No.: T9-P-30. - 20 stamen + 2 ml 2-aminoethanol, temperature 30 °C, length of time: 60 minutes.

2. The investigation material was collected on the 26th April 1999. Fresh and heated pollen grains on 200 °C during 10 minutes, 1hour, 5, 10 hours were investigated. Experiments numbers: T9-P-10, T9-P-11, T9-P-12, T9-P-13 and T9-P-14.

Results

Quantitative data of the partially dissolved pollen grains with 2-aminoethanol

Experiment number	Time of dissolution	Size (µm %)									Dominant size (µm)	Average (µm)
		32.5	35	37.5	40	42.5	45	47.5	50	52.5		
T9-P-19	5 min.	0.5	0.5	25	**35**	24	11.5	3.5			40	40.75
T9-P-20	10 min.				10	**41.5**	**37**	10.5	1		42.5; 45	43.78
T9-P-21	15 min.			2.5	10	**37**	**37**	12	1.5		42.5; 45	43.75
T9-P-22	20 min.				10	**43**	**42**	5			42.5; 45	43.55
T9-P-23	25 min.			2	10	**35.5**	**37**	14	1.5		42.5; 45	43.88
T9-P-24	30 min.			1	23.5	**44.5**	27	4			42.5	42.75
T9-P-25	35 min.				6	29.5	**45.5**	17.5	1.5		45	44.48
T9-P-26	40 min.		0.5	21	**33**	**34.5**	10	1			40; 42.5	40.90
T9-P-27	45 min.				0.5	19.5	**46**	29.5	4.5		45	45.45
T9-P-28	50 min.				5.5	**47.5**	39.5	7	0.5		42.5	43.75
T9-P-29	55 min.				0.5	11.5	**39**	**39**	9	1	45	46.20
T9-P-30	60 min.				9.5	**37**	**37.5**	15	1		42.5	44.03

Quantitative data of the heated pollen grains.

Experiment number	Time of heating	Size (µm, %)										Dominant size (µm)	Average (µm)
		30	32.5	35	37.5	40	42.5	45	47.5	50	52.5		
T9-P-10	0	1	4	31	**47.5**	16	0.5					37.5	36.8
T9-P-11	10 min.					3.5	8	29	**38**	20	1.5	47.5	46.7
T9-P-12	1 hour					2.5	13	**32.5**	**32**	17.5	2.5	45; 47.5	46.4
T9-P-13	5 hours				0.5	2	21	**42**	27	7	0.5	45	45.4
T9-P-14	10 hours					2	18	**42**	29.5	8	0.5	45	45.63

Qualitative alterations of the investigated pollen grains

There are minuscul alterations in consequence of the experiment. That the high temperature effect (Plate 10.1., figs. 4-15) was of no taxonomic significance, was surprising. The protruding character of the apertural area of the fresh pollen grains (Plate 10.1., figs. 1-3) disappeared. Alterations in the convexity of the sides of the pollen grains were not observed.

Discussion and Conclusions

1. The relative stability of the taxonomic important morphological characteristic features of these pollen grains is interesting.

2.1. The diameter of the pollen grains increased after short heating, which is more or less a general phenomenon.

2.2. The diminishing started after 1hour of heating, which is nearly constant at 45 µm. The average measure is 36.88 µm of the fresh pollen grains and of the heated pollen grains is the following were: 46.7 µm (10m), 46.4 µm (1h), 45.4 µm (5h), 45.63 µm (10h). In this way this characteristic feature is independent of the length of time of the heating. But the alterations of the per cents of the pollen grains of 42.5 µm indicate a significant trend: 0.5% (non heated), 8.0% (10m), 13.0% (1h), 21.0% (5h), 18.0% (10h).

3. The diameter of the partially dissolved pollen grains increased in general but the trend is irregular.

As final conclusion we can emphasize that the observed alterations are unusual in comparison with our several previous results of the heated or partially dissolved pollen grains.

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Plate 10.1.

Elaeagnus angustifolia L. recent.
1-3. - Fresh pollen grains.
4-6. - Heated pollen grains during 10 minutes.
7-9. - Heated pollen grains during 1 hour.
10-12. - Heated pollen grains during 5 hours.
13-15. - Heated pollen grains during 10 hours.
Magnification: 1, 4, 7, 10, 13 1000x; 2, 3, 5, 6, 8, 9, 11, 12, 14, 15 2500x.

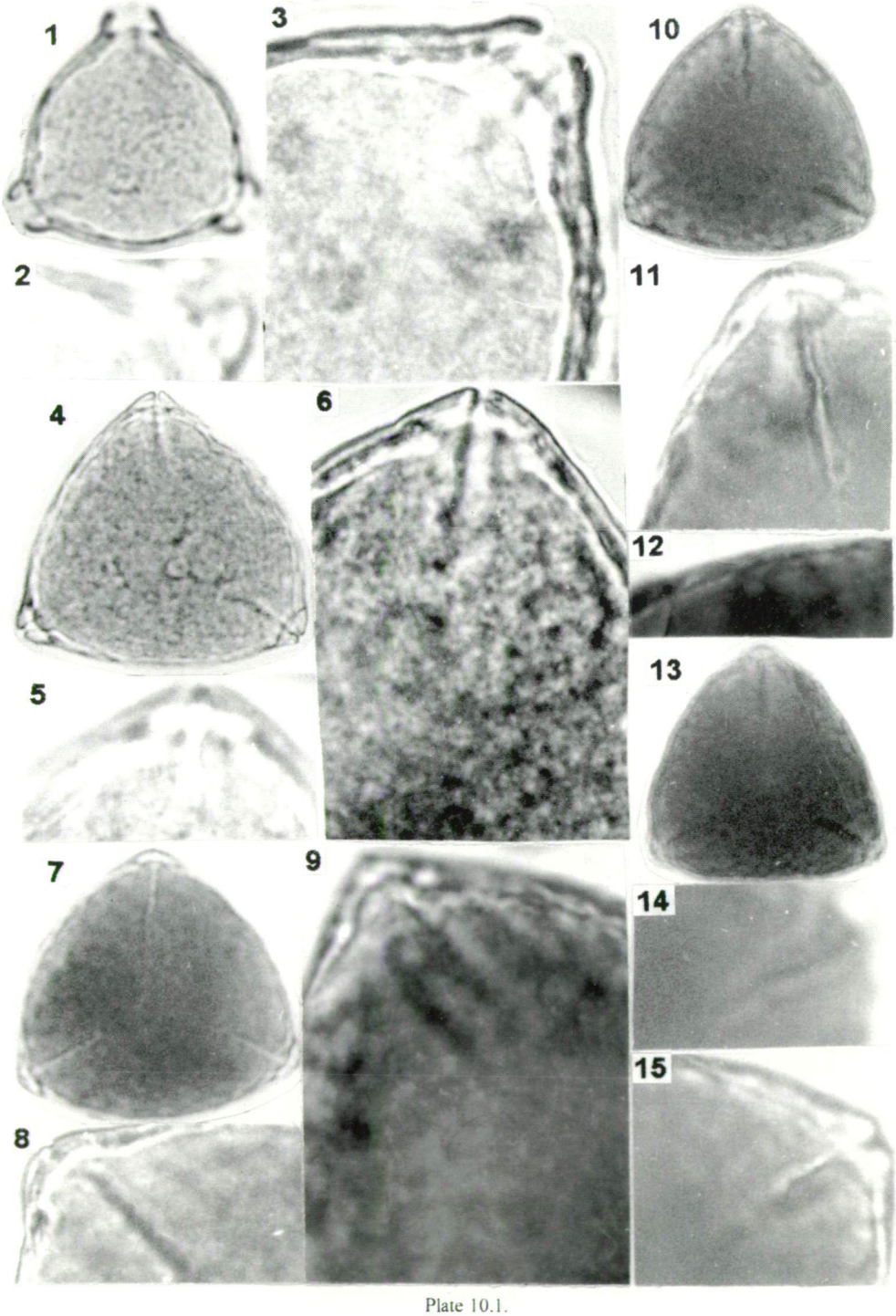

Plate 10.1.

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