9. X-RAY EFFECT ON THE LM MORPHOLOGY OF SOME ANGIOSPERM POLLEN GRAINS I.

M. KEDVES and Á. KÁROSSY

Cell Biological and Evolutionary Micropaleontological Laboratory of the Department of Botany of the J. A. University, H-6701, P. O. Box 993, Szeged, Hungary

Abstract

The alterations of the LM morphological characteristic features in consequence of X-ray irradiation were investigated at the following species: 1. Brevaxonate *dicotyledonous* pollen grains: *Plantago lanceolata, Carya illinoensis, Juglans nigra, Platycarya strobilacea.* 2. Monosulcate *monocotyledonous* pollen grains: *Hemerocallis lilio-asphodelus.* Among the new results presented herein, the extreme resistance to the X-ray irradiation of the pollen grains of *Platycarya strobilacea* may be pointed out.

Key words: Palynology, *angiosperm*, X-ray effect, light microscopy.

Introduction

Within this research program of our Laboratory the aim of this part is the following:

1. Three pollen types of *Juglandaceae* (*Juglans, Carya, Platycarya*), because the same genuses were investigated by partial dissolution of the biopolymer system of the exine.
2. Another point of view was the morphology of the pollen grains in the selection of the experimental material. The pollen grains of the genus *Plantago* represent periporate spherical form. The *Hemerocallis* type pollen grains is one of the earliest *angiosperm* forms. The monosulcate, monocolpate type, as it is well known, occur among the *gymnosperms* and *angiosperms* also, including the *dicotyledonous* and *monocotyledonous* taxa.

Materials and Methods

The data of the investigated species are the following:

Plantago lanceolata L.

Locality: Újszeged the left river-side of Tisza. Collected: Á. KÁROSSY, on 24.05.1995. Irradiation: on the 31.05.1995, LM investigation: on the 03.06.1995.

Carya illinoensis (WANG.) K. KOCH

Locality: Botanical Garden of the J. A. University. Collected: I. GÁSPÁR, on 27.05.1995. Irradiation: on the 30.05.1995, LM investigation: on the 03.06.1995.

Juglans nigra L.

Locality: Botanical Garden of the J. A. University. Collected: I. GÁSPÁR, on the 20.05.1995. Irradiation: on the 24.05.1995, LM investigation: on the 24.05.1995.

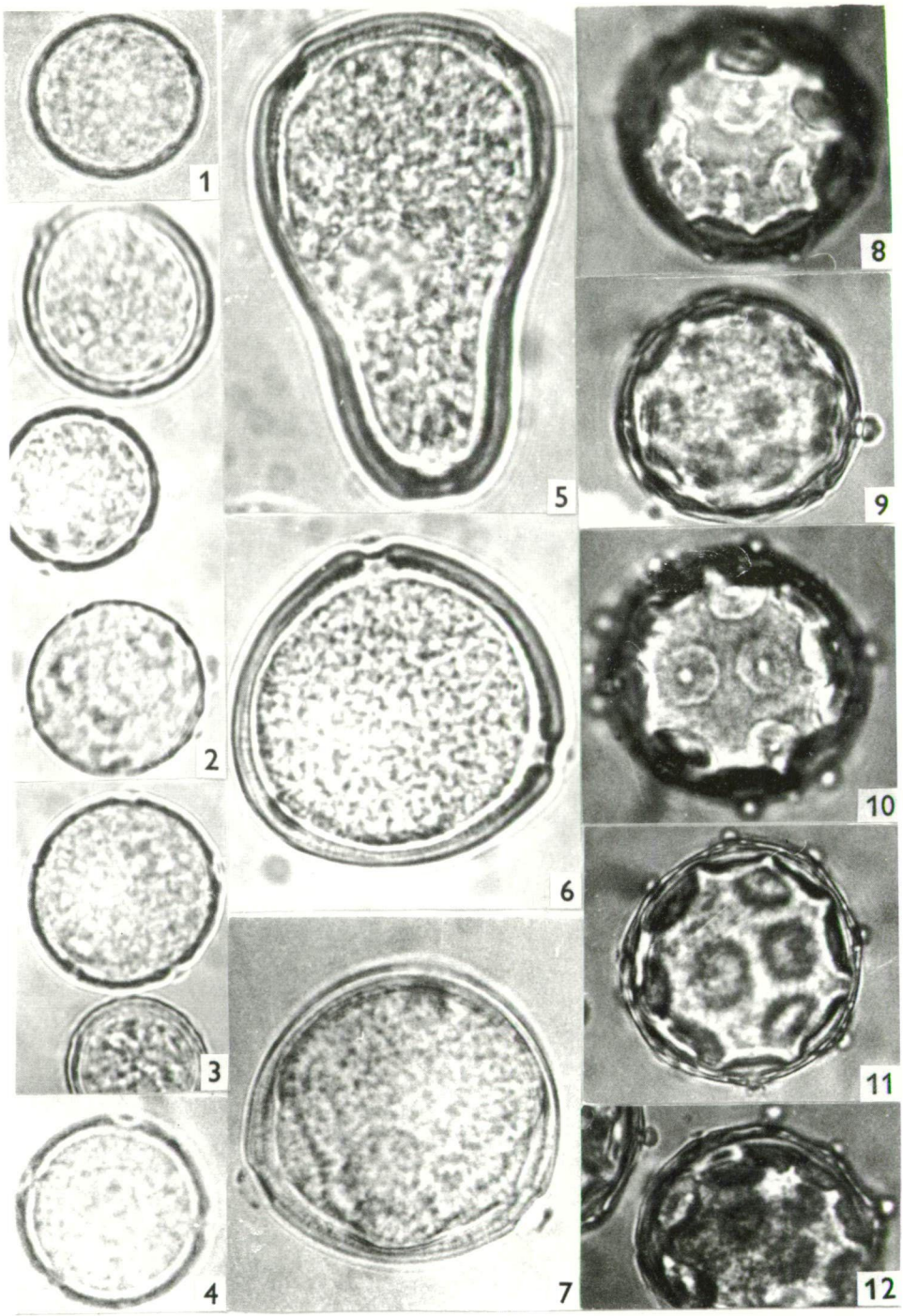

Plate 9.1.

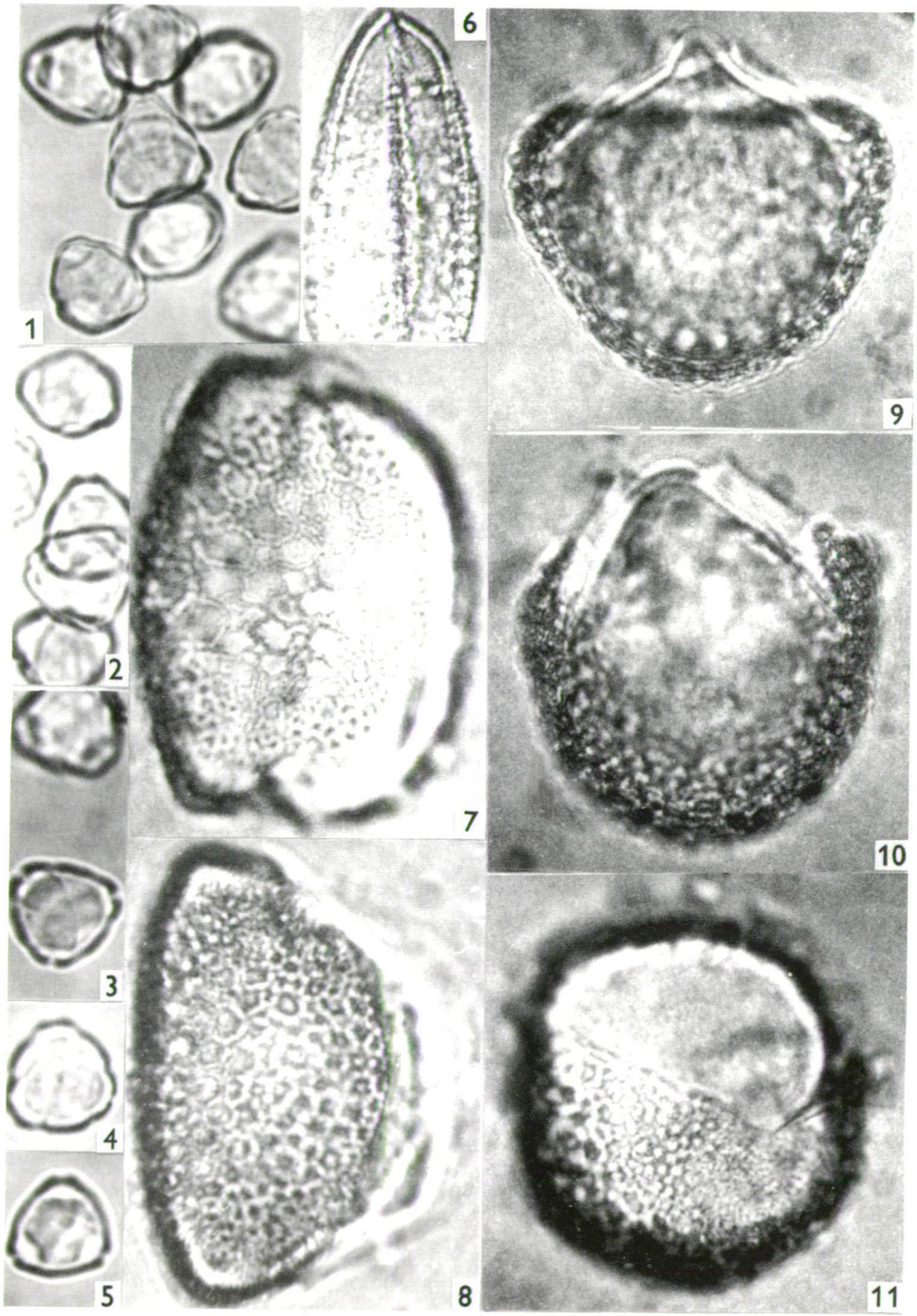

Plate 9.2.

Platycarya strobilacea SIEB. et ZUCC.

Locality: Botanical Garden of the J. A. University. Collected: I. GÁSPÁR, on 10.05.1995. Irradiation: on the 13.06.1995, LM investigation: on the 30.06.1995.

Hemerocallis lilio-asphodelus L. em. SCOP.

Locality: Botanical Garden of the J. A. University. Collected: Á. KÁROSSY, on the 24.05.1995. Irradiation: on the 01.06.1995, LM investigation: on the 05.06.1995.

Irradiations were made with a BRON-OM1 apparatus in the Radiological Laboratory of the Department of Mineralogy, Petrology and Geochemistry of the J. A. University, Szeged. Radiation data: 35KV, 20 mA, CuKα beam. Length of irradiation: 35'.

Results

Plantago lanceolata L. (Plate 9.1., figs. 1–4)

The pollen tube development in consequence of the X-ray irradiation at all apertures was observed at 50.0% (Plate 9.1., figs. 3,4). Partial pollen tube development was observed at 20.3% of the investigated pollen grains (Plate 9.1., fig. 2). A remarkable per cent (29.5) of the pollen grains are non-altered (Plate 9.1., fig. 1).

Carya illinoensis (WANG.) K. KOCH (Plate 9.1., figs. 5–7)

It is interesting that at this species the majority (89.0%) of the investigated pollen grains was non-altered (Plate 9.1., fig. 1). This form is "Siamense twin" aberrant. Partial pollen tube development was observed at 8.5% (Plate 9.1., fig. 6). Total pollen tube development occurred at 2.5 per cent of the investigated pollen grains (Plate 9.1., fig. 7).

Juglans nigra L. (Plate 9.1., figs. 8–12)

At this kind of pollen grains it was not so easy to establish in several cases whether the pollen tube development is total or partial. But according to present observations 34.0% of the pollen grains the pollen tubes were totally developed (Plate 9.1., figs. 11, 12). 48.0% were partially developed (Plate 9.1., fig. 9). Finally 18.0 per cent were non-altered (Plate 9.1., fig. 8).

Platycarya strobilacea SIEB. et ZUCC. (Plate 9.2., figs. 1–5)

As a surprising result 100.0 per cent of the investigated pollen grains were non-altered.

Hemerocallis lilio-asphodelus L. em. SCOP. (Plate 9.2., figs. 6–11)

At the greatest part of the irradiated pollen grains (65.0%) was totally developed (Plate 9.2., figs. 8–11). 11.5% represent the partially developed pollen tube of the irradiated pollen grains (Plate 9.2., figs. 7,8). 23.5 per cent of the investigated pollen grains were non-altered (Plate 9.2., fig. 6).

Plate 9.1.

1–4. *Plantago lanceolata* L., Recent, Experiment No: 1/7–174.
5–7. *Carya illinoensis* (WANG.) K. KOCH, Recent, Experiment No: 1/7–172.
8–12. *Juglans nigra* L., Recent, Experiment No: 1/7–124. 1.000x.

Plate 9.2.

1–5. *Platycarya strobilacea* SIEB. et ZUCC., Recent, Experiment No: 1/7–248.
6–11. *Hemerocallis lilio-asphodelus* L. em. SCOP., Recent, Experiment No: 1/7–177. 1.000x.

Discussion and Conclusions

The heterogeneous character of the pollen grains of *Juglandaceae* from the point of view of evolution was emphasized earlier (KEDVES, 1989). The resistance of the pollen grains of the genus *Juglans* to high temperature was established by KEDVES and KINCSEK (1989). These pollen grains are resistant also to organic solvents, cf. KEDVES, KÁROSSY and BORBOLA (1996). To this the resistance of the pollen grains of the genus *Platycarya* may be added.

Regarding the monosulcate (monocolpate) pollen grains we can point out the pollen tube development of 65.0% in consequence of X-ray irradiation at *Hemerocallis lilio-asphodelus*, in contrast to the previously investigated *Magnolia kobus* (KEDVES and UNGVÁRI, 1995). At this latter mentioned species this phenomenon was observed at 9.6% of the pollen grains. The importance of the monosulcate (monocolpate) pollen grains is well known. Further, multidisciplinary investigations are necessary to have sufficient data to establish general conclusions in every respect.

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