5. LM INVESTIGATIONS OF PARTIALLY DISSOLVED SCLEREIDS OF ARMENIACA VULGARIS LAM.

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Abstract

Sclereids of the endocarp of *Armeniaca vulgaris* were partially dissolved with diethylamine and merkaptoethanol, at 30 °C, during 5, 10, 20, 25, 30, 60, 90, 120, 150, 180, 210, 240, 270, 300, 330 and 360 days. For LM studies the partially dissolved sclereids were coloured with Toluidine Blue. This experiment has not altered in a perceptible measure the basic morphology of the thick wall of the sclereids. The alteration, namely the relative accumulation of the aromatic lignin derivates can be followed by the alteration of the colour of the Toluidine Blue stain. This alteration started after 10 days of dissolution, the colour changed to bluish-green, in contrast to the intensive blue colour of the sclereids dissolved for 5 days. In general the dissolution of the non-aromatic derivates was more intensive with diethylamine than with merkaptoethanol.

Key words: Armeniaca vulgaris, sclereids, partial dissolution, LM method.

Introduction

The TEM study of our Laboratory of partially degraded sporomorphs under natural and in vitro conditions started in 1974, with the paper of KEDVES, STANLEY and ROJIK. Later several papers were published dealing with the biopolymer structure and symmetry of the recent and fossil sporoderm. Collateral to the sporoderm partially degraded parenchyma, xylem and sclereids were also investigated with the TEM method. Preliminary results were published, cf. KEDVES (1991).

In 1991, KEDVES and ROJIK described regular pentagonal biopolymer units from partially degraded and fragmented sclereids of *Armeniaca vulgaris*. Results of the TEM investigations of the ultrathin sections of the partially degraded sclereids were published by KEDVES and PÁRDUTZ (1992). In recent years we started an extensive research program on the partially degraded sclereids of *Armeniaca vulgaris*. This contribution presents the first part of a long-lasting dissolution experiment, namely the results obtained by the LM method. This paper will be followed by the TEM results of the partially degraded and fragmented sclereids, including the symmetry operations of the biopolymer structures.

Materials and Methods

The material for investigation was collected by A. VÉR on 30.07.1991 in her garden. The cleaned endocarps were frozen at –20 °C, to avoid or diminish the alterations of the oxydation. On 28.01.1993 the material was dried for three days at 30 °C. After the endocarps were broken and filtered on an 0.4 mm sieve. The fragments of this size were used for experimental studies. To 20 mg fragments of endocarp sclereids 0.2 ml organic solvents (diethylamine and/or merkaptoethanol) were added. Temperature 30 °C. The experiments started on 02.02.1993.

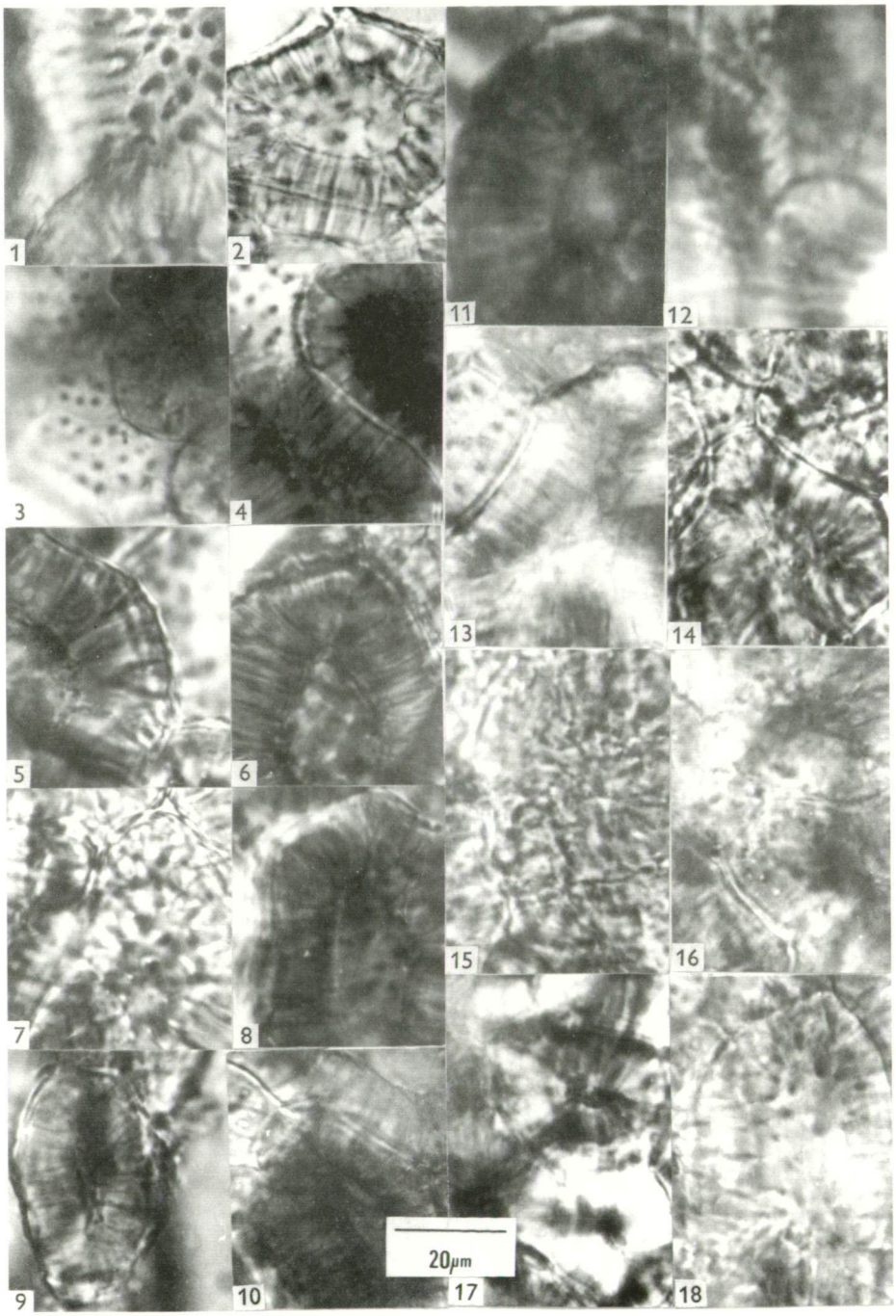

Plate 5.1.

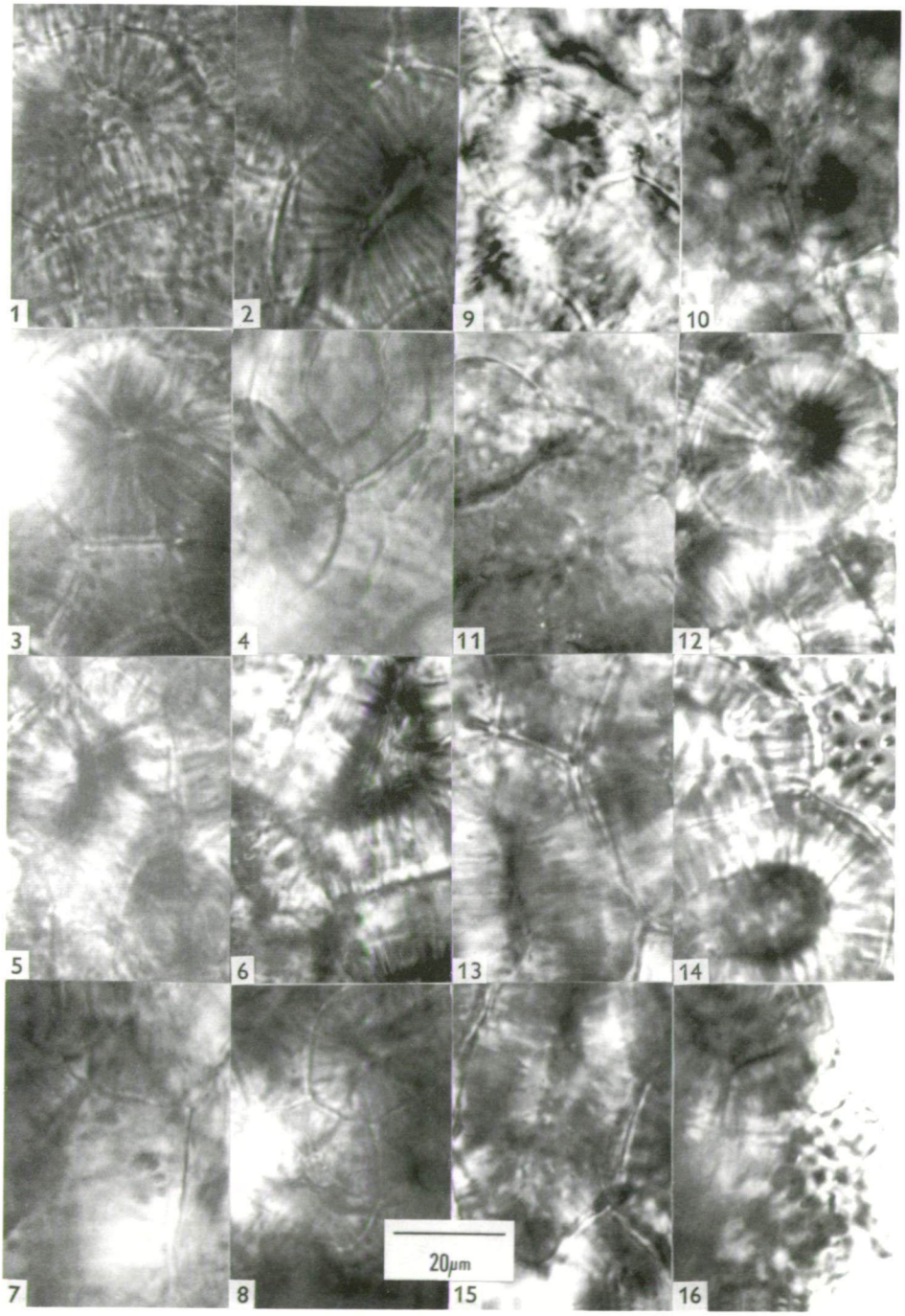

Plate 5.2.

No of experiment	Solvents		Length of time in days
	diethylamine	merkaptoethanol	
1602	+		5
1603		+	5
1604	+		10
1605		+	10
1606	+		15
1607		+	15
1608	+		20
1609		+	20
1610	+		25
1611		+	25
1612	+		30
1613		+	30
1614	+		60
1615		+	60
1616	+		90
1617		+	90
1618	+		120
1619		+	120
1620	+		150
1621		+	150
1622	+		180
1623		+	180
1624	+		210
1625		+	210
1626	+		240
1627		+	240
1628	+		270
1629		+	270
1630	+		300
1631		+	300
1632	+		330
1633		+	330
1634	+		360
1635		+	360

After dissolution the sclereids were washed carefully in distilled water. For LM studies the fragments were coloured with Toluidine Blue.

Plate 5.1.

1–18. *Armeniaca vulgaris* LAM., sclereids.
1. Experiment No: 1602, 2. Experiment No: 1603, 3. Experiment No: 1604, 4. Experiment No: 1605, 5. Experiment No: 1606, 6. Experiment No: 1607, 7. Experiment No: 1608, 8. Experiment No: 1609, 9. Experiment No: 1610, 10. Experiment No: 1611, 11. Experiment No: 1612, 12. Experiment No: 1613, 13. Experiment No: 1614, 14. Experiment No: 1615, 15. Experiment No: 1616, 16. Experiment No: 1617, 17. Experiment No: 1618, 18. Experiment No: 1619.

Plate 5.2.

1–16. *Armeniaca vulgaris* LAM., sclereids.
1. Experiment No: 1620, 2. Experiment No: 1621, 3. Experiment No: 1622, 4. Experiment No: 1623, 5. Experiment No: 1624, 6. Experiment No: 1625, 7. Experiment No: 1626, 8. Experiment No: 1627, 9. Experiment No: 1628, 10. Experiment No: 1629, 11. Experiment No: 1630, 12. Experiment No: 1631, 13. Experiment No: 1632, 14. Experiment No: 1633, 15. Experiment No: 1634, 16. Experiment No: 1635.

Results

(Plate 5.1., figs. 1–18, plate 5.2., figs. 1–16)

The light-microscopical morphology of the sclereids did not change in a considerable measure. The microphotographs in Plates 5.1., and 5.2. well illustrate the differences in the symmetry and general morphology of the sclereids. The effects of the two solvents followed by Toluidine Blue are the following:

The colour of the sclereids at experiment 1602 and 1603 is blue. From 1604 and 1605 until 1608 and 1609 the colour altered to bluish-green. After the above mentioned experiments the colour alteration caused by the two solvents is different. Green colour appeared (indicating the relative accumulation of the lignin derivates) at the sclereids of all further dissolution with diethylamine (1610, 1612, 1614, 1616, 1618, 1620, 1622, 1624, 1626, 1628, 1630, 1632). Finally the colour after the longest dissolution is yellowish green.

The colour of the sclereids dissolved partially with merkaptoethanol is bluish-green (1609, 1611, 1613, 1615, 1617, 1619, 1621, 1623, 1625, 1627, 1629, 1631, 1633, 1635).

Discussion and Conclusions

The alteration in consequence of the partial dissolution of the sclereids of *Armeniaca vulgaris* can be followed by the change of colour of Toluidine Blue. The dissolution of the non-aromatic compounds are more intensive with diethylamine. Merkaptoethanol did not dissolve completely the non-lignin derivate compounds even after 360 days.

Acknowledgements

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References

KEDVES, M. (1991): Quasi-crystalloid biopolymer structures from plant cell walls. – Bio Tár *7*, 31 (Hungarian).

KEDVES, M. and PÁRDUTZ, Á. (1992): TEM study of ultrathin sections of the partially degraded wall of the sclereids of *Armeniaca vulgaris* LAM. – Plant Cell Biology and Development *3*, 88–91.

KEDVES, M. and ROJIK, I. (1991): Quasi-crystalloid biopolymer organization from the sclereids of *Armeniaca vulgaris* LAM. – Plant Cell Biology and Development *2*, 59–62.

KEDVES, M., STANLEY, E. A. and ROJIK, I. (1974): Observations nouvelles sur l'ectexine des pollens fossiles des Angiospermes de l'Eocène inférieur. – Pollen et Spores *16*, 425–437.