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A New Record of Perforated Ray Cells in *Platanus orientalis* L. *1

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穿孔을 지니는 버즘나무의 放射組織 細胞 *1

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要 約

本 論文은 버즘나무科의 버즘나무 (*Platanus orientalis* L.)에 있어서 木部 放射組織내에 穿孔을 지니는 放射組織 細胞가 存在함을 처음으로 報告하는 것으로 이들 放射組織 細胞의 穿孔板은 導管要素 相互間에 發達하는 穿孔板과 同一하게 單一穿孔板과 階段狀穿孔板을 지니는 것으로 밝혀졌다.

Keywords : Perforated ray cells, *Platanus orientalis* L., simple and scalariform perforation plates

1. INTRODUCTION

Perforated ray cells are ray cells, the secondary xylem cells derived from ray initials, of the same dimensions or larger than the adjacent cells but with perforation plates and lateral wall pitting like those of vessels[1,2], and connect a vessel on one side of a ray with a vessel on the opposite side of that ray[2,3]. These ray cells with perforations were referred to as 'perforated ray cells' by Chalk and Chattaway[4] and as 'vascular ray cells' by McLean and Richardson[5]. The perforated ray cells may occur individually or in radial or tangential rows, and radial rows of perforated ray cells with perforations in tangential walls have been described as 'raidal vessels'[2,6]. On the other hand, the type of perforation in a perforated ray cell may be simple, scalariform, reticulate, or foraminate, and dose not necessarily coincide with the type of perforation plate occurring in the vessel elements of the same wood[2].

Since Chalk and Chattaway[4] recorded for the first time the occurrence of perforated ray cells in a number of families, this feature has been known to be of common feature in some hardwood families[3,5,7~24]. However, there has been apparently no previous records of perforated ray cells in woods of Platana- ceae.

In this paper, occurrence of such perforated ray cells in the rays of *Platanus orientalis* L. belonging to the family Platanaceae is reported for the first time.

2. MATERIALS AND METHODS

The wood specimens were obtained from the living branches of *Platanus orientalis* L. on the campus of the College of Agriculture and Life

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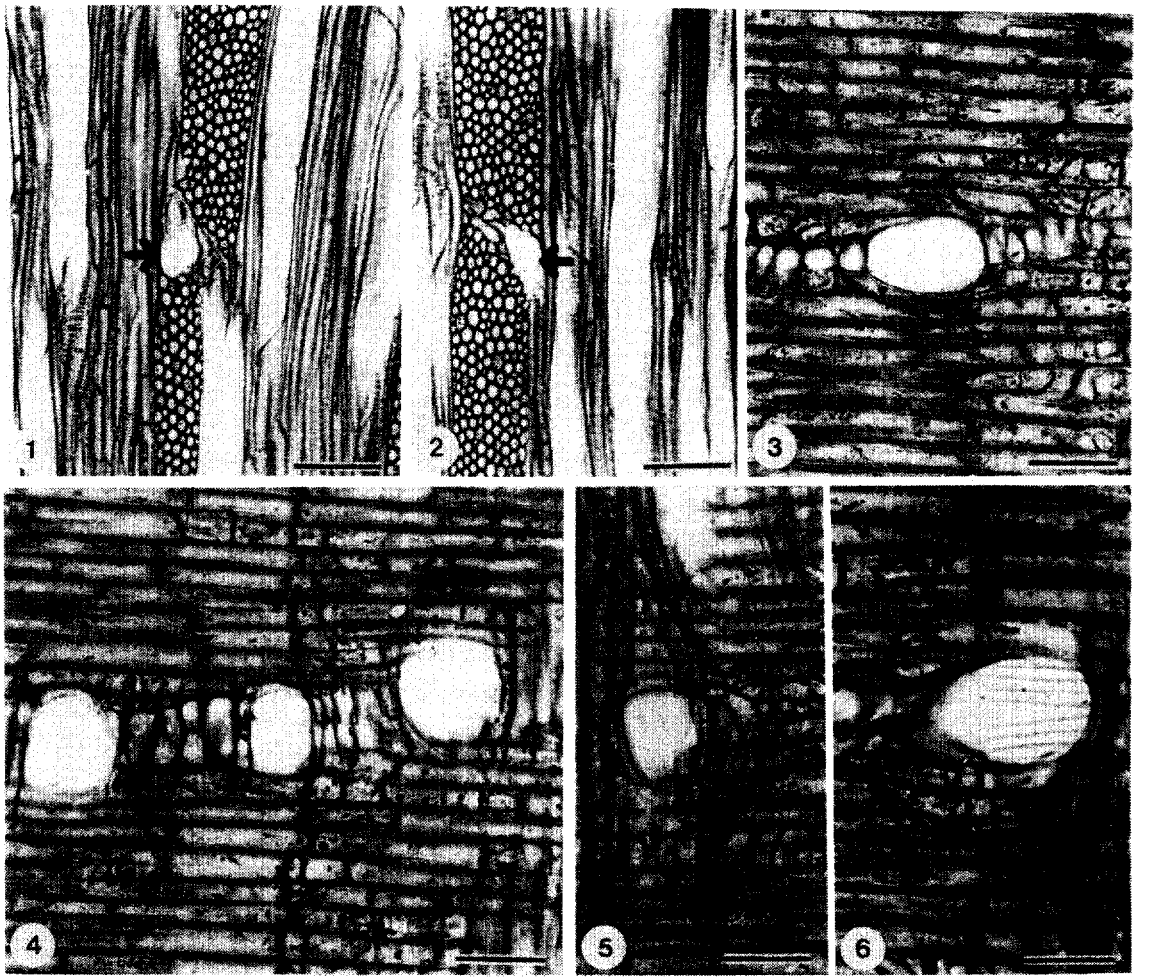
Sciences, Seoul National University, Suwon, Korea, and their subdivided blocks of *ca.* 1 to 2 cm^3 size were immediately softened in water in an autoclave for 90 minutes. The softened blocks were stored in a mixture of equal volumes of glycerine, ethyl alcohol, and water till sectioning[25]. From these blocks, transverse, radial, and tangential sections of 20 to 30 μm thickness were cut with a sliding microtome and permanent slides were prepared after staining with safranine, dehydration in ethyl alchol and xylene series, and mounting with Canada balsam[26]. The observation and photomicrography were made by the aid of Axioskop routine microscope with attachment camera, Carl Zeiss, Germany.

3. RESULTS AND DISCUSSION

Platanus orientalis L. was known to show ray characteristics as follows: 2~6/mm, rarely 1 (2)-seriate, mostly multiseriate up to 14 cells



Figs. 1~2. Tangential sections showing perforated ray cell(↑) in the multiseriate part of ray. Scale bars=100 μm.
Figs. 3~6. Radial sections showing perforated ray cell with simple(3-5) and scalariform(6) perforation plate. Scale bars=50 μm. *Platanus orientalis* L.

wide, distending tangentially at the ring boundaries, up to *ca.* 3 mm high; homocellular, composed almost exclusively of procumbent cells, sometimes with one marginal row of square cells; many chambered crystalliferous[27].

Perforated ray cells are found only in the multiseriate part of the rays (Figs. 1-2) as reported in a few genera[3,4,12,20]. However, these perforated ray cells observed so far have been mostly confined to the uniseriate extensions of long rays and exclusively uniseriate rays[7,13-16,18,19,22]. Thus, perforated ray cells may not be confined only to the marginal cells of uniseriate extensions of the rays as described by Dayal et al[12]. And the perforation plates in the perforated ray cells are simple (Figs. 3-5) and scalariform with horizontal bars (Fig. 6), corresponding with the types of perforation plate on the adjacent vessel elements. This is in agreement with the reports by Nazma et al[18], Dayal et al[12], and Rudall[21]. The fact, however, that the type of perforation in a perforated ray cell dose not necessarily coincide with the type of perforation plate occurring in the vessel elements of the same wood was described by Teixeira[23], Rao et al[20], and IAWA Committee[2]. Perforated ray cells usually have perforation plates in their radial walls (Figs. 3-6), but ray cells with perforations in tangential walls (Figs. 1-2) are also observed. The ray cells with perforations in their radial and tangential walls considered to be of two possibilities in connecting two axial vessel elements in tangential and radial direction[23], and these perforated ray cells were believed to connect a vessel on one side of a ray with a vessel on the opposite side of that ray[2,3] and sometimes to be found in woods in which breakup of large rays into smaller segments is occurring actively[1]. The perforated ray cells are usually much larger than the surrounding ray cells (Figs. 1-6), which were generally known to be of the same dimensions or larger than the adjacent cells[2]. On the other hand et al.,[12] Rudall[21], and IAWA Committee[2] stated that the presence or absence of perforated ray cells alone could not be of diagnostic value in wood identification because of their spasmodic occurrence.

4. CONCLUSION

Perforated ray cells are recorded for the first time in wood rays of *Platanus orientalis* L. belonging to the family Platanaceae. And the perforation plates in the perforated ray cells are simple and scalariform, corresponding with the types of perforation plate on the adjacent vessel elements in the same wood.

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