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## The Mechanism of Liquid Movement in a Wood Cell Cavity by Continuous Visual Observation I.

### Liquid penetration in tracheid cells for each pretreated sample under a vacuum

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**Abstract:** In this research, samples of heartwood from three softwood species (hinoki, Douglas-fir and sugi) were treated by 1)hot water extraction ; 2)compression perpendicular to grain ; and 3)a method combining extraction and compression, respectively. The liquid penetration behavior was observed continuously and macroscopically. The results obtained are as follows : 1)Penetration by capillary pressure (degree of suction 0 kPa) involves a repeated process of advancing and stalling. The degree of increase in the penetration length was untreated wood  $\leq$  hot water extraction-treated wood < compression-treated wood < extraction / compression combination-treated wood. 2)The influence of the degree of suction on the penetration rate was different in each species. The method of improving penetration of sugi is eliminating the extractive and that for Douglas-fir it is extending the effective access. 3)The liquid penetration between one tracheid and the adjacent one was easy to induce in hinoki, but it could not be confirmed for Douglas-fir and sugi. 4)There were two kinds of bubbles that occurred by pressure reduction. The formation of round bubbles occurred because of the inflow of air from an adjacent tracheid. The formation of a long bubble was because of cavitations in the longitudinal direction of the tracheid.

**Keywords:** liquid penetration, visual continuous observation, degree of suction, tracheid

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