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<AT>Influence of Drying of Chara Cellulose on Length/Length Distribution of Microfibrils after Acid Hydrolysis

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<ABS-HEAD>ABSTRACT

<ABS-P>Chara is a genus of freshwater alga that is evolutionarily observed at the aquatic-terrestrial boundary, whose cellulose microfibrils are similar to those of terrestrial plants regarding the crystallinity and biosynthesis of cellulose. Oven-dried and never-dried celluloses samples were prepared from chara. Terrestrial plant cellulose samples were used as references. The lengths and length distributions of oven-dried and never-dried chara cellulose microfibrils after acid hydrolysis with or without pretreatment by 2,2,6,6-tetramethylpiperidine-1-oxyl (TEMPO)-mediated oxidation, which was used for efficient fibrillation of acid-hydrolyzed products, were observed by transmission electron microscopy. All terrestrial plant celluloses and oven-dried chara cellulose had short nanocrystal-like morphologies of 100–300 nm in length after acid hydrolysis. In contrast, the never-dried chara cellulose had much longer microfibrils of ~970 nm in length after acid hydrolysis. These results indicated that disordered regions present periodically along the cellulose microfibrils, which cause the formation of cellulose nanocrystals after acid hydrolysis, are not present in inherent chara cellulose microfibrils in water, but are formed artificially under drying or dehydration conditions.

<H1>1. INTRODUCTION

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