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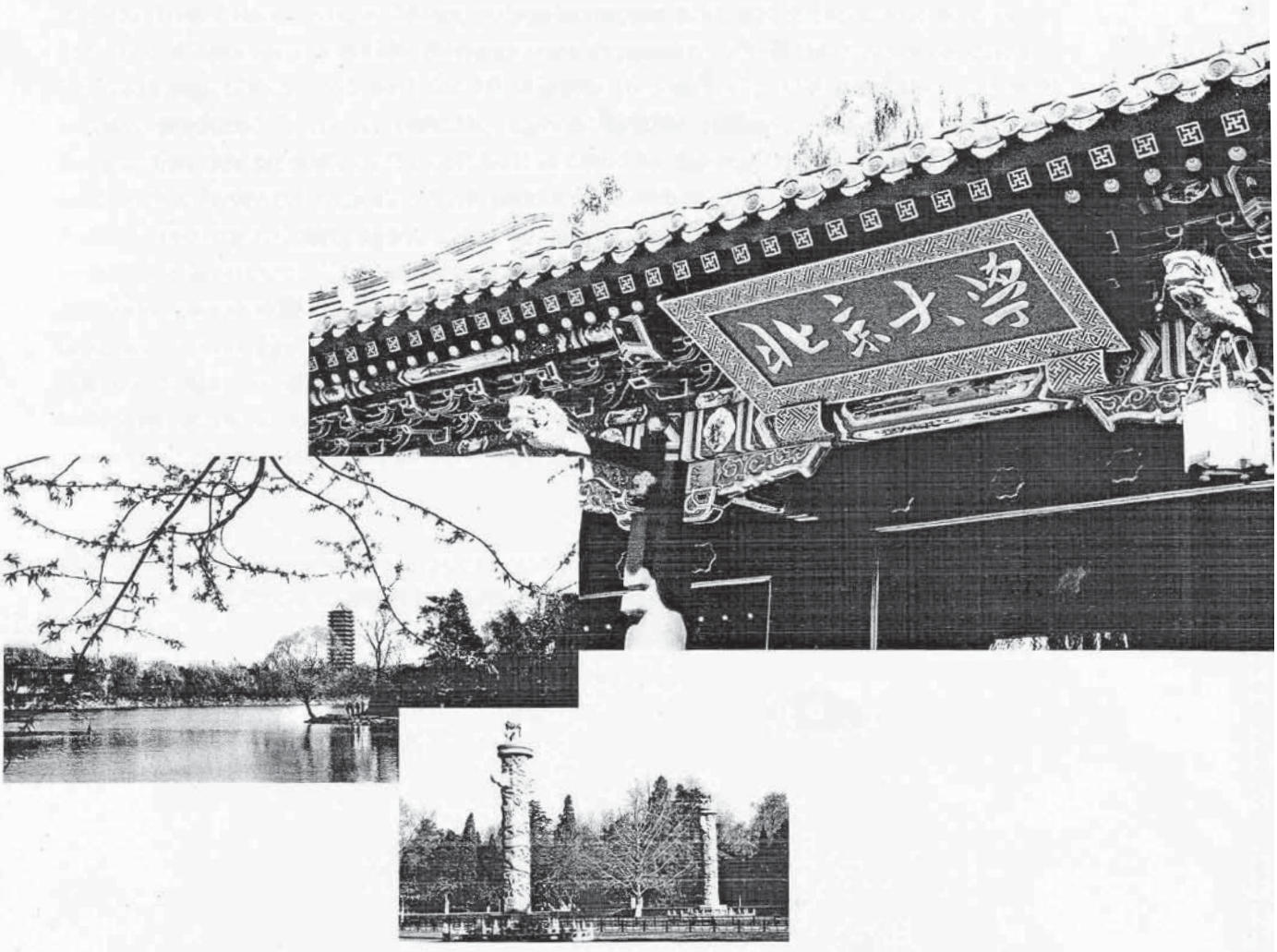

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The effect of UV radiation on the plant cell wall

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Using electron paramagnetic resonance (EPR) spectroscopy, two spin-traps DEPMPO (5-diethoxyphosphoryl-5-methyl-1-pyrroline-N-oxide) and BMPO (5-*tert*-butoxycarbonyl-5-methyl-1-pyrroline-*N*-oxide) capable of differentiating between different free radicals, we have examined redox effects of UV irradiation on cell wall isolates from *Pisum sativum* leaves, polygalacturonic acid, and galacturonic acid in the presence of hydrogen peroxide. Systems were exposed to UV-B (maximum emission at 312 nm) and UV-A (366 nm) for 10 minutes (6 J m^{-2} s^{-1}). UV irradiated cell wall isolates produced hydroxyl radicals, carbon dioxide radicals, and superoxide. We showed that this property of the cell wall is based on the reaction of (poly)galacturonic acid with a hydroxyl radical, which produces a carbon dioxide radical as a product. Acting as strong reducing agent, a carbon dioxide radical reacts with molecular oxygen to produce superoxide. The production of superoxide was observed for cell wall isolates, polygalacturonic acid (in the presence and in the absence of calcium) and galacturonic acid, and it was diminished upon superoxide dismutase supplementation. We propose that the results presented here shed new light on the mechanism of superoxide and hydrogen peroxide production in the extracellular compartment and on some other UV-related phenomena, such as CO_2 emission.

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