

Isolation and Expression Analysis of Two DOPA Dioxygenases in *Phytolacca americana*

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Z. Naturforsch. **64c**, 564–573 (2009); received February 17/March 19, 2009

Betacyanins and anthocyanins, two main red flower pigments, never occur together in the same plant. Although the anthocyanin biosynthetic pathway has been well analyzed, the biosynthetic genes and the regulatory mechanism of the betacyanin biosynthesis are still obscure. We cloned two cDNAs of DOPA dioxygenase from *Phytolacca americana*, *PaDOD1* and *PaDOD2*, that may be involved in the betalain biosynthesis. The deduced amino acid sequence of *PaDOD1* and *PaDOD2* showed approximately 80% homology to each other. The promoter regions of *PaDOD1* and *PaDOD2* were isolated by inverse PCR and analyzed using PLACE database. Some putative MYB, bHLH, and environmental stress-responsive transcription factor binding sites were detected in the *PaDOD1* and *PaDOD2* promoter regions. Expression patterns of *PaDOD1* and *PaDOD2* in suspension cultures of *P. americana* were investigated by semiquantitative RT-PCR. The transcripts of *PaDODs* were found in both betacyanin-producing red cells and non-betacyanin-producing white cells, suggesting that not only the expression of *DOD*, but also the supplementation of DOPA might be a regulatory step for the betalain biosynthesis in *P. americana*.

Key words: Betalain, DOPA Dioxygenase, *Phytolacca americana*