

## DEVELOPMENT OF A NOVEL GENE TRANSFER METHOD IN *PORPHYRA*

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Foreign genes have been successfully transferred into both animal and plant by transgenesis, but introduction of foreign genes into many important algae species is still in its infancy. Although nuclear and organelle transformations in *Chlamydomonas reinhardtii*, a green microalgal species, have been well established, attempts to develop transformation methods for macroalgae, such as *Volvox carteri* and several diatom species have just begun. Currently, there is no report of success of genetic transformation in *Porphyra* species (seaweed).

To facilitate applications of seaweed in both basic research and integrated aquaculture biotechnology, we have undertaken initiatives to develop gene transfer technology for *Porphyra*, and made significant progress. A plasmid DNA with a selection marker was transferred into archaeospores of *P. leucosticta* by electroporation. Total DNA was then prepared from those electroporated samples at various times of incubation including 24 hrs, one week, two weeks and up to two years. PCR analysis showed the consistent presence of plasmid DNA in all samples tested, strongly suggesting the success of gene transfer in *Porphyra*. The thalli developed from those transformed archaeospores grow well under continuous presence of selection pressure over two years with serial transfers. Reverse transcription (RT)/PCR analysis of RNA samples isolated from transgenic thalli showed expression of the transgene. These observations provide us with great confidence that genetic manipulation and production of transgenic *Porphyra* is feasible.

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