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NRT2.5 A PUTATIVE SODIUM DEPENDENT HIGH AFFINITY NITRATE TRASNPORTER OF ZOSTERA MARINA L.

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Seagrasses are the only group of vascular plants that recolonized the marine environment, possibly the most severe habitat shift ever accomplished by flowering plants. These plants have regained functions enabling them to thrive in liquid medium with an extremely high salinity (0.5 M NaCl), high alkaline conditions (pH 8.2) and very low concentration of essential nutrients as NO_3^- or Pi. Despite this, seagrasses form one of the highest productive and widespread ecosystems of the planet (Larkum *et al*., 2006). *Zostera marina* (L.) was the first seagrass fully sequenced and its genome reveals important insights about this secondary adaption (Olsen el al., 2016). Comparison with land plants indicates that less than 20 % of the genes families are specific in the genome of seagrasses (Olsen *et al*., 2016). Thus, adaptation to marine environment seems to be due to molecular changes of the same family genes rather that the speciation of pre-existing genes. This appears to be the case of the high affinity nitrate transporter belonging to the *NRT* family. In contrast to terrestrial vascular plants, where *NRT2* encode high affinity NO_3^- transporters that operate as H^+ symporters, our electrophysiological analysis indicate that in *Z. marina* high affinity NO_3^- uptake is mediated by a Na^+-dependent mechanism (Rubio *et al*., 2005). A detailed analysis of the *Z. marina* genome indicates the presence of only one gene encoding for this type of transporter: *Zosma70g00300.1*. Phylogenetic analysis shows that this high affinity nitrate transporter is more related to NRT2.5 than to NTRT2.1, sharing a common ancestor with both, monocot and dicot plants. We have cloned *Zosma70g00300.1* and the high-affinity nitrate transporter accessory protein NAR2 (*Zosma63g00220.1*) in order to characterize the specific transport mechanism mediated by these proteins in *Z. marina*. Thus, the putative *Z. marina* NRT2.5 transporter could have evolved to use Na^+ as a driving ion, which might be an essential adaptation of seagrasses to colonize the marine environment.

References.

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