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A clathrin assembly protein from *Arabidopsis thaliana* possesses adenylate cyclase activity and is involved in responses to biotic stress factors

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The need to develop agricultural crops with improved stress tolerance and/or resistance has led plant biotechnologists to strategically focus onto those plant molecules involved in the initiation and sustenance of cellular homeostasis. One such molecule, typically involved in signal transduction, is the cyclic adenosine 3',5'-monophosphate (cAMP) generated by the enzyme adenylate cyclase (AC). However, even though ACs have previously been experimentally proven to be centrally involved in numerous stress response systems in various organisms (bacteria, fungi and lower eukaryotes), their existence and/or functional roles in higher plants have until recently, been a matter of debate and serious controversy. To date, only four higher plants ACs have been functionally confirmed, specifically in *Arabidopsis thaliana, Zea mays, Nicotiana benthamiana* and *Hippeastrum hybridum*. Apparently, since it is inconceivable that a single AC per plant can account for all the currently known and/or reported cAMP-dependent processes in higher plants, we then, in this study, set out to enzymatically and functionally characterize a second probable AC candidate from *A. thaliana* in the form of a putative clathrin assembly protein (AtCAP: At1g68110), with a view of elucidating its exact physiological and biological roles in higher plants. In this regard, we then firstly conducted a preliminary bioinformatic analysis of this putative protein candidate followed by its molecular cloning, recombinant expression and endogenous activity assaying, then its affinity purification and *in vitro* functional characterization and finally, its co-expressional and bioinformatic functional analysis. Our findings unequivocally, indicated that this novel protein is indeed a multi-domain, multi-functional bona fide soluble adenylate cyclase (sAC) responsible for biotic stress responses and whose functional activities are essentially mediated by the cAMP via a calmodulin/SORLIP1AT core motif-dependent signaling system.

Biography

Oziniel Ruzvidzo has completed his Doctoral degree in Plant Biotechnology in 2009 at the University of the Western Cape in South Africa. He also undertook some Post-doctoral studies in the same subject area in 2010 at the University of Cape Town, South Africa. Currently, he is a full Professor and Principal Investigator of Plant Biotechnology in the Department of Biological Sciences at the North-West University, Mafikeng Campus, South Africa. He is an active member of several university committees including the Senate as well as an Editorial Member of various academic and research boards locally, regionally and internationally.

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