INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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Thesis Title: **Cell signaling and functions mediated by a serine-threonine phosphatase regulatory subunit and related proteins in *Neurospora crassa***

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SHORT ABSTRACT

In this thesis work, I investigated cell functions mediated by the calcineurin B (CNB-1) subunit in *Neurospora crassa*. I studied how the mutations in the various EF-hand domains of CNB-1 result in diverse phenotypes under stress conditions, including calcium (Ca^{2+}) stress, thermotolerance, and regulation of the circadian clock in *N. crassa*. Furthermore, I established genetic interaction of *cnb-1* with the *nca-2*, *hsp80*, *crz-1*, *frequency* (*frq-1*), and *white-collar* (*wc-1*) genes in the regulation the heat shock, Ca^{2+} stress and circadian clock in *N. crassa*. Moreover, I found that the upregulation of *nca-2* during Ca^{2+} stress requires the binding of the transcription factor calcineurin responsive zinc-finger-1 (CRZ-1) to an 8 bp nucleotide sequence 5′-ACCGCGCC-3′, which is about 234 bp upstream of the ATG start codon of the *nca-2*. Furthermore, CRZ-1 physically binds to two other 8 bp nucleotide sequences 5´-CCTTCACA-3´ and 5′-AGCGGAGC-3′, which are about 1167 bp and 679 bp upstream of the ATG start codon in the promoter of *hsp80* under heat shock conditions in *N. crassa*. Therefore, the calcineruin-Crz-1 signaling cascade is important for cell survival under Ca^{2+} stress and heat shock conditions in *N. crassa*.