Conclusion

"Striving for success without hard work is like trying to harvest where you haven't planted".
-Dabid Bly

Being a village-dweller, I was much interested about the tribal people, especially their food and life-style. In my early age itself, I noticed that most of the tribal peoples are thriving entirely on local produce and usually formulate their own medicine from the locally available herbs and shrubs. Being a student of Botany at later stage, I have developed a strong intension to work on medicinal herbs and shrubs used by the tribal.

Subsequently, I initiated the present endeavor in spring of 2012 with a view to explore different ethnic knowledge as well as pharmacomedicinal properties of selected Mimosoids. In addition, a comprehensive molecular appraisal of those Mimosoid species and their microsymbionts from Northern part of Bengal was subjected to investigate for the first time. Wide lists of plants have been reported locally to be used in treating several local ailments. Since my focus is on the utilization of Mimosaceae, I found different Mimosoids having therapeutic effects; for instance, *Mimosa pudica* and *M. invisa* were reported to heal leucorrhoea, breast cancer or tumor. Further, tender leaves of *Acacia nilotica* were found to be used to treat diabetes. The bark of *A. catechu* was reported to be effective against bone crack, ankle sprain and leucorrhea while *A. concinna* is used to promote hair growth. Furthermore, the bark of *Albizia lebbeck* is used as anthelmintic and also in case of eczema, leucoderma and other skin disorders. Interestingly, *A. catechu* was identified to be used as ethnoveterinarian purposes.

Initiative was further taken to justify local ethnomedicinal claims. In-depth antioxidant and cytotoxic profiling through different standard methods reflected that *A. catechu* (ACL), *A. nilotica* (ANL), *M. pudica* (MPD) and *M. invisa* (MIN) could be used as potent antioxidative as well as non-toxic stuffs which in turn can ameliorate different ROS-mediated disorders including diabetes and neurodegenerative ailments leading to a healthy and hassle-free life. Based on the information obtained from native *Oraon* community, the first idea came to mind is to validate of the use of *A. nilotica* (ANL)

as anti-diabetic. It was observed that ANL significantly modulated blood glucose level, insulin level and glycogen level in alloxan-induced diabetic mice along with restoring of different biochemical and metabolic aspects responsible for the progression of diabetes. Thus the potentiality of ANL is well-justified and holds a new hope for the discovery of new anti-diabetic drug. In addition, findings of enhanced cholinesterase (AChE) inhibitory approach (*in-vitro*) in different extracts provoked me to explore the probable memory-restoration capabilities in rodent model (*in-vivo*) after the administration of extract. Interestingly, *M. pudica* and *M. invisa* were found to be effective to ameliorate the brain-impairment by means of endorsing brain enzymatic function against oxidative stress. Thus, most importantly, it is the first evidence of neurotherapeutic role of MPD and MIN in neutralizing ROS-mediated neuronal damage thereby demands utmost attention for developing CNS drug.

Advanced phytochemical screening involving FT-IR, GC-MS and NMR analysis explored wide array of phytochemicals in ACL, ANL, MPD and MIN extracts. Amongest these, galiic acid, squalene, catechin, epicatechin, isoquercetrin, β-sitosterol, campesterol, stigmasterol, pyrogallol, catechol, α-tocopherol, γ-tocopherol etc. were the main active bio-molecules contributing pivotal role in the management of several diseases and disorders. Moreover, it may easily be postulated that these phytochemicals were the main contributors of exerting free-radical scavenging activity, anti-diabetic activity and anti-neurodegenerative activity. More surprisingly, finding of dopamine (a neurotransmitter) in *A. catechu* extract and its probable biosynthetic pathway is the first report that enriched this endeavor to a great extent.

I, further, aimed to obtain the underlying mechanism that how does a phytocompound act with selective proteins as agonist or antagonist in drug discovery, thereby I designed *in-silico* drugability predictions of different phytocompounds and selected proteins. The ROS-generating proteins including FAS Ligand protein, Toll like receptors and NADPH oxidase effectively bind with targeted ligands such as, β-sitosterol, campesterol and stigmasterol (identified in MPD and MIN extract) signifying their probable role in hindering ROS generation while prominent binding of the same ligands with human brain membrane protein (dopamine receptor D3 protein) suggests their role in the management of neurodegeneration like AD, PD etc. Further pharmacokinetic study supports this view and confirms that MPD and MIN extracts could be treated as future CNS drug. Effective binding patterns of selected phytochemicals (α-tocopherol, γ-tocopherol; identified in ANL extract) with Nrf2 protein (5FNQ) could represent a useful strategy to prevent ROS-mediated

diabetes and several diabetic complications including kidney, liver damage after various toxic insults. Hence, ANL may play pivotal role in the management of diabetes.

While considering molecular study, a good deal of genetic diversity was observed among 9 important Mimosoids including *Mimosa pudica*, *M. invisa*, *Acacia nilotica*, *A. nilitica* var. *indica*, *A. catechu*, *A. concinna*, *Albizia lebbeck*, *A. chinensis* and *Samanea saman* (*Albizia saman*) using different DNA fingerprinting techniques. A total of 330 polymorphic bands were generated using several RAPD primers while PCR-RFLP analysis explored a total of 20 polymorphic bands with 86.96% of polymorphism due to their polyphyletic nature of the different genera under Mimosoideae. DNA barcode analysis through matK and TrnL-F clearly reflected that the members of Mimosoideae and Caesalpinioideae are closer than the members from Papilionoideae validating the traditional classification. During molecular documentation of micro-symbionts of selected Mimosoids, it was observed that the six isolates of *Rhizobium* strains produced 97.39% of polymorphism.