PREFACE

The presented dissertation entitled "**Exploration of Anti-inflammatory and Anti-arthritic Properties of *Aloe vera* (L.) Burm. f. from the Sub-Himalayan West Bengal, India**" is done under the supervision of Prof. Soumen Bhattacharjee in the 'Cell and Molecular Biology Laboratory' of the Department of Zoology, University of North Bengal. The work was initiated by me in the March of 2013. In this course, Prof. Tapas Kumar Chaudhuri (Now retired Professor, Cell and Molecular Immunology Lab, Department of Zoology) directed my work as my co-supervisor.

Aloe vera is one of the most explored plants which has a world-wide use as food, widely used in dermatological industries and medicine industry, it has a home-made therapeutic use for dermatological problems, often used as laxative, consumed and topically used in pain reduction and utilized in the herbal medication system. This plant naturally grows in all the tropical and sub-tropical countries. The use of this "miracle plant" for its medicinal properties has been well documented in the ancient civilizations and by the ethnic communities all through the World. However, when I started searching the underlying scientific principles of such useful aspects of the plant during my post-graduation period, it became evident that most of the activities are not scientifically well-proven and these ethnic belief lack strong scientific documentation. Along with that, an increasing demand for an alternative medicinal system in the last decade also forced me to start the experiment-dependent evidence-based pharmacological studies of this plant. An increasing research activity in the field of natural medicine, plant-based medicine, plant-based synergistic formulations and plant-based pure compounds has been the reason for the origin of different efficient drugs of this era. It is well understood that the amazing biodiversity of the sub-Himalayan West Bengal region of India can also lead to the discovery of such herbal resources.

All the above perspectives led me to select the plant *Aloe vera* as the experimental herbal resource. The anti-inflammatory activities of the plant as well as the anti-rheumatic properties of the plant gel have been explored in detail in this dissertation work. The common use of the *Aloe vera* gel in joint pains by the local people of the sub-Himalayan region was scanned under the light of science. The consumption of the gel by the common people in a crude and unprocessed

condition following a fresh collection has been the major cues for determining the strategies and doses of the plant gel for *in vivo* and *in vitro* studies.

Animal model based *in vivo* studies as well as *in vitro* studies have been undertaken to find the role of gel constituents in inflammatory and arthritic conditions. Different physiological properties and parameters were studied and the benefits of orally consumed *Aloe vera* gel were assessed after the induction appropriate inflammatory or arthritic condition in appropriate animal models. In all the studies, Wistar albino rat was used as a model animal for *in vivo* studies. The transcriptomic analyses of some major proteins involved in inflammation as well as rheumatoid arthritis are also done through real-time quantitative PCR to explore the deep logic of such initial findings. The *Aloe* gel constituents are also identified using the available scientific reports and were used for the assessment of its efficacy through sophisticated computer silumation techniques. The findings are explained and corroborated in a detailed way so that the probable pathways for the inflammation and arthritis inhibition done by the *Aloe vera* gel could be revealed. All these findings are published as research articles in reputed journals.

The thesis contains a brief introduction in **Chapter 1**; **Chapter 2** represents the Review of Literature; **Chapter 3** represents the Materials and Methods; **Chapter 4** describes the Results and associated Discussions and **Chapter 5** represents the Summary and Conclusions.