

DECLARATION

I declare that the thesis entitled "Studies on antioxidant, antimicrobial and antidiabetic activities of some ethnomedicinal plants collected from Darjeeling Himalayan region, West Bengal" has been prepared by me under the guidance of Professor Shilpi Ghosh, Department of Biotechnology, University of North Bengal. No part of this thesis has formed the basis for the award of any degree or fellowship previously.

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No.....

Date..... 27/03/2023.....

27th March, 2023

This is to certify that Mr. Vaskar Das is submitting his thesis entitled “**Studies on antioxidant, antimicrobial and antidiabetic activities of some ethnomedicinal plants collected from Darjeeling Himalayan region, West Bengal**” on the basis of his work for the award of Ph.D degree from the University of North Bengal carried out under my supervision at the Department of Biotechnology, University of North Bengal.

He bears a good moral character and I wish him all the best in life.

 27/3/2023

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Studies on antioxidant, antimicrobial and antidiabetic activities of some ethnomedicinal plants collected from Darjeeling Himalayan region, West Bengal Thesis submitted to University of North Bengal For the award of Doctor of Philosophy in Biotechnology Submitted by Vaskar Das Supervisor Professor (Dr.) Shilpi Ghosh Department of Biotechnology University of North Bengal Raja Rammohanpur, Siliguri 2023

Chapter 1 General Introduction, Objectives and Review of Literature

1.1. Introduction Natural products (NPs) have been used to combat human diseases for thousands of years; and therefore play a vital role in drug discovery and development (Thomford et al., 2018). Most of the NPs with therapeutic efficacy are secondary metabolites. The underlying reason for NPs as sources of such a large proportion of existing drugs might be the similar interaction of NPs with biosynthetic enzymes and therapeutic targets (Nair and Jez, 2020). NPs provide greater structural diversity than standard combinatorial chemistry and thus they offer major opportunity for finding novel therapeutic leads that are active against a wide range of assay targets. Moreover, they contain higher numbers of chiral centers and greater steric complexity than either synthetic drugs or combinatorial libraries. Generally, biologically active NPs with drug like properties are small molecules that are capable of being absorbed and metabolized by the body. In addition, the development costs of NPs as medicines are likely to be much lower than that of biotechnological products or compounds produced from combinatorial chemistry (Wright, 2018). Plants are the basis of traditional medicine (TM) systems that have been used for thousands of years. The plant based TM system continue to play important role in healthcare and according to the report of World Health Organization (WHO), about 80% of the world's population rely mainly on TM for their primary health care. TM and ethnobotanical information have also played an important role in scientific research, particularly when the literature and field work data have been properly evaluated (Chaachouay et al., 2019). A large number of plant derived NPs continue to be discovered on the basis of traditional or empirical local medical practices. Globally, about 80% of plant derived drugs have the same or related use as the plants from which they were derived and rest only 20% of plant derived drugs were discovered independently of medicinal folklore information. According to a report only 10% of the world's biodiversity has been tested for biological activity, still many more useful NPs are remains to be identified. Plants are endowed with a variety of bioactive chemicals that may have a synergistic effect on plant biological activities. Thus, in order to identify safer drugs and synthesize pharmaceutically significant lead chemicals, it is essential to screen active substances and understand their chemical composition (Mariswamy et al., 2011). With the emergence of several purification techniques and the isolation of pure compounds or phytochemicals, drug discovery might be facilitated. These compounds have been discovered to play a potential role in many pathway regulations and could be used as ligands for in silico drug design. Several chromatography techniques, like column chromatography, thin layer chromatography, high performance liquid chromatography, flash chromatography and Sephadex chromatography have been used to separate bioactive substances for identification, quantification and characterization (Sasidharan et al., 2011). Despite variations in the polarity of phytochemicals continue to pose a challenge for isolating pure compounds, several plant derived therapeutics NPs have been developed (Sheeja and Kuttan, 2007; Mukherjee et al., 2007).

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