CHAPTER 1

Introduction

The word 'toxicology,' originally derived from the term in Greek 'toxikon' meaning 'a bow' (for shooting poisoned arrows) or 'poison' (for dipping arrowheads) was classically connotated as the 'science of poisons'. Centuries ago Philippus Aureolus Theophrastus Bombastus von Hohenheim Paracelsus (1493-1541), regarded as the 'Father of Toxicology' fostered the emergence of this scientific discipline by establishing the importance of dose-response relationship, summarizing the concept in his well-known statement:

''All substances are poisons; there is none that is not a poison.
The right dose differentiates a poison and remedy''

Paracelsus in his time advanced several revolutionary views which are now considered as fundamental concepts in the field of toxicology. Even, an old Sanskrit adage says that nectar ('amrit' or that which removes 'mrtyu' or death) is a poison if consumed in excess. This has been proven more than correct in recent times. The response is related to the dose and the same chemical, which acts effectively as a drug in low doses, could be a poison in higher doses. However, over the past few decades this field has expanded beyond the dose-response relationship to encompass studies addressing not only the interaction between chemicals and biological systems determining their potential to cause adverse effects in living organisms, but to also assess their hazard and risk of human exposure thus providing a basis for appropriate precautionary, protective and restrictive measures.

Toxicology, considered to be a borrowed science evolved from ancient poisoners, stands as one of the historic practical sciences in India, drawing insights from the knowledge of extracts from plants and animal venom for the use in medicines, hunting, warfare, and assassination. The rapid growth of chemical and pharmaceutical industry post-liberalization era in India unleashed a spectrum of hazards potentially towards human and environmental health, underlying the need to accurately predict and assess the risk potential of these chemicals, providing a stimulus for the emergence of toxicology as a separate entity. Since its inception in the 1960s, the scope and interest in this arena has continued to broaden and the subject, formerly a part of pharmacology has undergone a dimensional change to develop into a fully-fledged discipline.

Today, toxicology research in India is positioned at the crossroad of transition from traditional studies of experimentation using animals in the late 1960s to the mechanistic understanding of toxicological endpoints using 'omics' approaches that allow better confidence in the subsequent risk assessments. Once a part of pharmacology, toxicology now stands as separate entity capitalizing in interdisciplinary areas of pharmacology, analytical chemistry, microbiology, molecular biology and biotechnology. With time, toxicology in India has evolved into a recognized discipline with its dedicated group of toxicologists, educational institutions, sub-disciplines, professional societies and reputed journals. This book aims to trace the historical growth of the subject in India, its origin and development, highlighting significant innovative breakthroughs that revolutionized the discipline in the country. This book also envisages to provide a comprehensive overview of few of the most significant contributions of India in the field of toxicology.