Protozoan diseases caused by malarial parasite (*Plasmodium*), amoeba and *Leishmania* sp. are the major health hazards to mankind especially in developing countries like India. So far, more than 65,000 species of protozoa have been recognised but only a few of them are known to parasitize man and lesser creatures causing serious diseases. Treatment of majority of these diseases is still in an unsatisfactory state. Protozoan diseases especially those caused by free living amoebae like *Acanthamoeba* and *Naegleria* exhibit remarkable resistance to virtually all known drugs and chemotherapeutic agents but the biochemical and genetic basis of the resistance is not known. This resistance may be due to inability of drugs to reach their target of action either due to impermeable barrier, as in case of cyst formation, or due to their rapid detoxication and metabolism inside the cell. Science of chemotherapy must include understanding of the complex host, parasite, drug interactions. This understanding is essential to combat the emerging drug resistance in malarial parasites and other protozoa to drugs. The encystation of the amoebae appears to be regulated by catabolite repression, presence of specific inorganic and organic inducers or metabolic inhibitors. Inhibition of DNA synthesis, drop in polyamine levels or other biochemically determined forces halting the growth phase of the cell, may regulate the transition of cells from vegetative state to cystic form. The mixed function oxidase system involving cytochromes may also play important role in metabolism and disposition of drugs and variety of other foreign compounds that may prove harmful to amoeba thus neutralizing the existing potency of their action. Deciphering of the excystation mechanisms and nature of drug metabolising system may prove helpful in development of cysticidal and other drugs to check this still unconquered organism.
The second major problem in the eradication of protozoal diseases is their ability to adapt their life cycle to alteration in host systems and to differentiate into dormant structure, able to escape host defences and chemical agents, that can survive for prolonged periods but re-establish once the suitable environment is encountered. In case of *E. histolytica*, the fragile anaerobic amoeba, cysts are the major epidemiological problem in spread of disease. Understanding, the basic molecular mechanisms of differentiation, and delineation of suitable molecular targets are, therefore, must for any meaningful strategy for control of protozoal diseases.

*E. histolytica* although cultivated in axenic media free from bacterial associates, has so far defied all efforts at encystation. Related amoeba *A. culbertsoni* has been therefore employed to decipher the basic mechanism of encystation.

The present investigation was undertaken to answer some of the above questions especially the mechanism of action of different inducing factors of encystation *vis-a-vis* role of cyclic nucleotides and polyamines in growth and differentiation, to explore alternate target for chemotherapy and determine the nature of microsomal redox system of *A. culbertsoni* involved in drug metabolism and possibly its drug resistance. The results are presented in the subsequent chapter of the thesis.