Summary of Chapters

Chapter 1

This Chapter deals with a detailed description on the material and methods employed in the first part of this study.

Chapter 2

In order to conduct the mutagenic assays, a reliable test system is necessary which ensures a considerable number of metaphase cells for the chromosome analysis. In mammals, usually the bone marrow has been considered as the target tissue for the chromosome analysis on account of its high mitotic index. In amphibians, the major hemopoietic organs are the bone marrow and spleen. However, the activity of these organs are bound to have seasonal variations. In this chapter an attempt has been made to evaluate the mitotic activity of the bone marrow in the frog *Rana tigerina* for a period of two years. Results revealed that mitotic activity initiates in this species after the breeding season and attains maximum in December- January months. During other seasons the mitosis was found negligible. Studies suggest that the species *Rana tigerina* can be used for the mutagenic assays only during October to January season.

Chapter 3

Clastogenic effects of three metallic chloride salts (Mercuric chloride, Cadmium chloride and Nickel chloride) were examined in the frog *Rana tigerina*, after the ip injection of these chemicalq in two sublethal concentrations. Animals were sacrificed

after 6hrs, 24 hrs and 48 hrs after administration and the chromosomes were analysed from the bone marrow. A comparative assessment of the effects of these three heavy metal salts revealed that the $HgCl_2$ is the most toxic of all followed by $CdCl_2$ and $NiCl_2$. The types of aberrations were almost similar in all cases which include, chromatid breaks, colchiploidy, hypodiploidy, multiple breaks, fragmentation, dicentric chromosomes and pulverizations. However, incidences of increase in dicentric chromosomes after the treatment with $NiCl_2$, breaks and hypodiploidy after the $HgCl_2$ treatment, and pulverization after the $CdCl_2$ treatment, were recognizable from the data.

Chapter 4

Effect of Lead acetate was evaluated on the bone marrow chromosomes of the frog *Rana tigerina* after the administration of the chemical in two sublethal doses as well as exposing the animals to two different sublethal concentrations of the solutions. Intraperitoneal administration of this chemical could not evoke any significant number of aberrations in the frog. However, exposure of this chemical for 14 days in a higher concentration revealed significant number of aberrations in the bone marrow. Since, chromatid breaks and acentric fragments are less frequent and complex aberrations such as multiple breaks were absent Lead acetate could be assumed to exert only a weak clastogenic action on the bone marrow of frogs.

Chapter 5

This chapter deals with an evaluation the clastogenic effect of effluent contaminated river water on the bone marrow chromosomes of the frog *Rana tigerina*. As the major contaminant of this effluent was found as cobalt, a separate series of experiments were also conducted to assess the effect of Cobalt on the frog chromosomes. Effluent water was diluted to different concentrations to make the different treatment media. Results revealed a dose dependent increase in the frequency of chromosomal aberrations after the treatment. Major aberrations include, centromere breaks, chromatid breaks, fragmentation and pulverizations. However, when the frogs were treated with Cobalt sulphate, the increase in chromosomal aberrations were nonsignificant. It was apparent from this result that the mutagenicity of river water not solely depend on the presence of Cobalt, but probably, on a combination of various components present in and a low pH of the water.

Chapter 6

This part of the investigation has been concentrated on some field studies conducted in Shoolpaneshwar wildlife sanctuary, situated on the left bank of Narmada valley in Gujarat. This area is comparatively less disturbed and devoid of pollution. The faunal studies conducted in this area revealed the presence of 13 species of anurans out of the total 19 species of amphibians reported hitherto from Gujarat. The species richness in this area has been analysed in relation to the historical, biological as well as physical factors that could potentially affect the distribution.

There are several species of amphibians in the sanctuary which have distribution in Southern peninsular as well as north east India, which substantiates the evidence of Satpura hypothesis by Hora. Apart from that the high species richness of the area depends on various ecological factors. A direct correlation of amphibian diversity has been found in relation to the quantity of biomass, leaf litter and overall vegetation in the area. Because of the better climatic conditions and moderately high rainfall, sanctuary supports a wide variety of plants, which further increase the habitat heterogeneity and sustained primary productivity of the ecosystems. Sanctuary provides the habitats for a large number of insects, the principal prey of anurans. Altogether a well-balanced ecosystem mostly devoid of human intrusion supports the habitats for a wide variety of anurans.

The analysis of distribution in different agroclimatic region shows that the South Gujarat is having the maximum species richness primarily due to the better climatic conditions. However, the high species richness of this region is merely confined to the Dangs and Shoolpaneshwar sanctuary, the areas that are devoid of pollution.

The studies reveals that the apparent species richness of an area depends upon various factors such as climatic conditions and geographic features which in turn determines a habitat heterogeniety and well-balanced ecosystems. Nevertheless, the pollution is the major factor which determines the species richness in a region.