GENETIC STUDY ON SOME MUTAGENIC PARAMETERS IN DIFFERENT LIVING SYSTEMS

By

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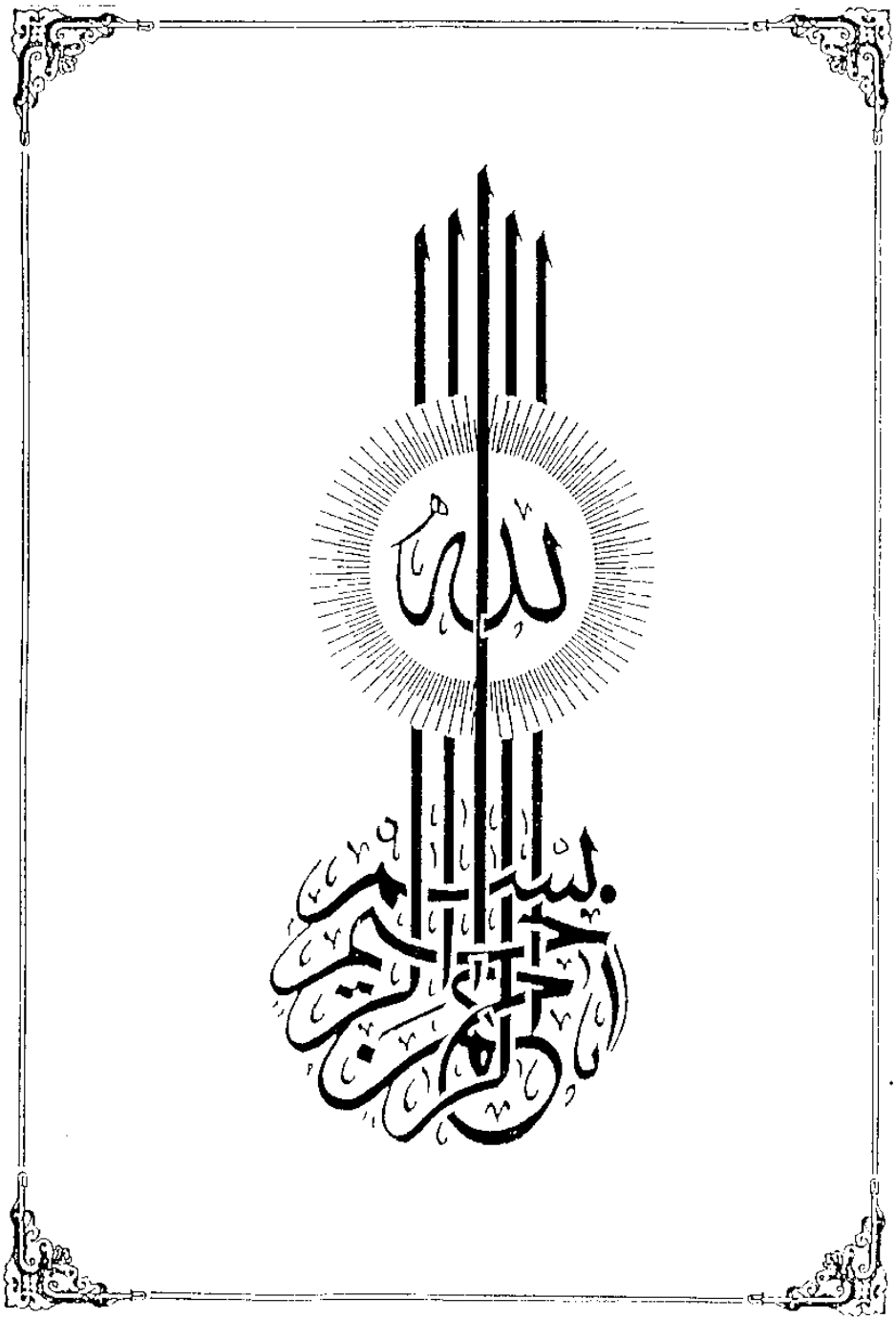

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ABSTRACT

The three pesticides paraquat., diquat and larven were tested for their mutagenic potentiality using D_7 strain of *Saccaromyces cerviseae* to detect gene convesion and reversion. Cytological examination of *Vicia faba* (var. Giza 2) root tips cells and flower buds was carried out to detect mitotic and meiotic abnor-

malites, respectively, The bone marrow assay, in mice has been also involved as a standard *in vivo* test system.

In yeast system, the three chemicals proved to be positive in general. In addation, different types of chromosamal abnormalities in both mitotic and meiotic division have been induced in the two cell types. In animals treated by $^1/_{40}$ of $L_{D_{50}}$ of each chemical, the data showed different chromosonal and chromatid aberrations, where larven showed the lowest clastogenic potentiality. However it induced the largest frequencies of stikiness (44.3%) as compared with (32.9%) for paraquat, and (13.3%) for diquat. Morever larven also revealed the heighst potentiality for inducing multiploidy. Accordingly the pesticide larven proved to be positively active as a mutagenic compound, compared with the two pesitcides which could be considered as positive controls. Quantitative and qualitative differences, as well as the sensitivity of different assays, could be detected.

Results indicated that a wide range of genotoxic activities detected in cells of organisms belongings to differnt taxa in the evolutionary ladder might be of great significance for studing environmental mutagenesis in the biosphere. This target exceeds the aim of evaluting the results in the lights of their validity for extrapolation to humans. It could be suggested that more attention must be paid to this point, and special assay systems deserve to be developed to test the phenomena related to environmental mutagenesis under different conditions and locations.

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Introduction

Some leading scientists state that the field of genetic toxicology might lose its credibility, if a direct effort to assess and quantify genetic risks from human exposures was not carried out and succeeded (Sobels, 1992). They suggest that some extrapolation problems would be solved using dosimetry and a parallelogram approach. Moreover, the transgenic organisms were expected to offer a future less cost-and-time consuming opportunity for risk assessment studies (Sobels, 1992; Waters, 1992).

In spite of the fact that the importance of such requirements and achievements for genetic toxicology is undebatable, the situation in environmental mutagenesis must be different. While in genetic toxicology it is Man self-centered and medically oriented, environmental mutagenesis is prefered to be biosphere-centred, and hence biologically oriented. The present work was carried out in the frame of the latter concept. In the light of this concept geneticists easily agree that agents, capable of inducing hereditary variations in different living organism in our biosphere, and not only in man, must be detected and screened. As far as possible, their mode of action must be thoroughly studied, as they might affect, not only Man's health, but also his economy and the quality of his future biological resources (undesirable mutations, new races of pathogens,.. etc.). Consequently the exposure of biosphere to their influences must be minimized and controlled.

Keeping in mind the methodological limitations of different short-term systems, it was postulated that they are able to determine the mutagenic potential, rather than the mutagenic activity of tested compounds (Zimmerman, 1982). As

these compounds may or may not express their potential activity in all organisms or in all cell types, a battery of test assays including widely varied organisms, with the possibility of investigating the main types of mutational end-points in different cell-types, is highly recommended.

In the present study, three organisms (yeast, broad bean and mice) were used to study different end points induced by three pesticides; paraquat, diquat and larven in four cell types (the whole cell of yeast as a unicellular microorganism, somatic and germ cells of broad bean (*Vicia faba*) as a higher plant, and bone marrow cells of mice as mammals). Two out of the three pesticides used (paraquat and diquat) proved to be positive in one assay or another (Seylypes, 1980, Joenje, 1987), while no enough data are available for larven. Examining the mutagenic activity of the latter, as well as, comparing the activities of three pesticides constitute the body of the work which aimed to contribute to the role of environment mutagenesis in facing the natural and man-made problems in the biosphere.