I. Cultural characteristics of two selected strains of *Aspergillus chevalieri* designated as 73070 and 88 were studied. The rate of growth of the strains was determined in 8 different culture media, both liquid and solid having 25% agar agar. The two specific media nos. 7 and 8 were used for inducing production of conidiospores and ascospores respectively. The morphological structures of the strains were examined and a comparative study was made.

The strains were grown in liquid media described above and antibiotic production was tested against gram+ and gram- bacteria as test organisms. *Aspergillus chevalieri* 73070 was finally selected for genetical studies on consideration of its fast growth, conidial colour, sexual reproducibility and pigment and antibiotic production in synthetic media.

II. The spore suspension of *A. chevalieri* (73070) was irradiated with UV rays the dosages administered being 50, 100 and 150 ergs/cm²/sec, the exposure time being 0 to 960 seconds in different sets of the experiments. The experiments were repeated several times. Per cent survival and mutation was determined and 85 strains of biochemical mutants were isolated and characterised.
The next experiment was done with nitrogen mustard as a chemical mutagen. The time of treatment was from 0 to 40 minutes. Total number of isolates was 43 biochemical mutants and 100 morphological mutants. The pooled mutants from different acts were tested by assay against Salmonella typhosa and alteration of antibiotic activity e.g. increase, decrease, loss and no change was tested. The mutants with increased antibiotic activity were grouped according to the range of antibiotic inhibition zone.

III. Modifying effects of environmental and cultural conditions on the mutagenic properties of UV radiation have been investigated by pre-, post- and during irradiation treatment with nitrogen mustard at the sub-mutagenic level. The survival and mutation frequencies were determined. The pre-irradiation treatment showed higher mutagenic effect than that of others.

Similar experiments were done to determine the modifying effects of aminoacid, nucleic acid and vitamins. In all cases the treatments definitely exerted influence on mutation frequencies in A. niger. There was not much qualitative difference between mutants isolated from pre-, post- or during irradiation treatments.

IV. The characteristics of the morphological mutants isolated from experiments on UV irradiation were studied with special reference to the rate of growth, texture of colony, colour of conidia, formation of conidia and ascospores and antibiotic production. The mutant
types were initially divided into groups and sub-groups and described and finally 22 representative mutant strains of *A. chevalieri* (73070) were studied in detail.

At the next step (four) morphological mutant strains were selected to study their growth behaviour and antibiotic production. The incubation temperature, period of incubation and pH of the medium for optimum production of antibiotics were determined. The effect of temperature higher than the incubation temperature was also determined. Of the biochemical mutants developed through UV irradiation and XE treatment 350 strains of nutritional deficient ones were divided into 29 groups including those with unknown growth of factor requirement. The nutritionally deficient mutants were characterized and change of conidal colour and antibiotic production were noted. Two strains of morphological mutants and one biochemical mutant were irradiated for the development of second-step mutants and mutants with more than one nutrition deficiency were isolated. They were also characterized in the same way as before. The physiological characteristics of the first and second-step mutants were studied and utilization of the required growth substances by mutants were noted.

V. Heterokaryotic recombinations were formed between several pairs of biochemical mutants of which recombination could be made
Selections made amongst the heterokaryons from each recombination group were studied for further test of segregation. The segregation pattern was studied and there were distinct patterns observed. No stable heterokaryons diploid condition was observed in the recombination experiments of the mutants. The heterokaryons retained antibiotic producing capacity in almost all cases.  

VI. The occurrence of reverse mutation was studied with an argininosuccinate nitrogen mustard, biochemical mutant derived from A. chavallieri by treatment, designated as U₂₅ N₁₂ arg₁₂⁻². There was increase of reversion of mutants with UV treatment and this was followed by treatment with formaldehyde. The other chemical agents used were (1) H₂O₂, (2) nedolone, (3) S-methylthiourea, (4) S-methylcytosine, (5) aninouracil, (6) bromouracil and (7) nitro-uracil. The mutagens were tested alone and in combination with UV. There were positive results in all the latter cases but no reversion occurred in the former except in (4) where S-methyl-cytosine was used alone.