SUMMARY

At present different banding techniques are in use in the field of chromosome cytology. These banding techniques fall into two broad groups. One group requires the use of fluorescent dyes which need to be activated by UV-light. The other requires staining with Giemsa solution after treating the chromosomes variously as boiling in buffer solution or denaturating them with alkylating agents or digesting the chromosomes with proteolytic enzymes, etc. The different banding techniques offer improved possibilities for chromosome identification, for the studies concerned with karyotype evolution, cytotaxonomy, for the assignment of known linkage groups, a more detailed study of the genotype-phenotype correlation, accurate genetic counselling, localization of genes to specific chromosome regions, interpretation of structural rearrangement etc. These banding techniques are also useful in clinical cytology.

Microchromosomes have been reported in various plant and animal genera and in different malignant cell-lines of mouse, rat and human. Such microchromosomes were reported in the stem-line cells of a mouse ascites (Sarcoma-180) cell-line. The aim of the present work is to study the nature of the chromatin material of these microchromosomes through banding analysis.

This cell-line shows a chromosome number ranging from

66-79 with a mode at 72-74. Additionally, 1-4 microchromosomes are present in about 80% of the cells. These microchromosomes are feulgen-positive and show DNA-positive staining with acridine orange. A metacentric chromosome is present in about 60% of the cells and it serves as a marker. This chromosome shows band at the median region and it has been established that this bi-armed chromosome has arisen due to Robertsonian translocation. All other chromosomes are telocentric. A 'dicentric' chromosome with C-bands at both ends is also found. Apart from this alleged 'dicentric' one, one or two small dicentric chromosomes are also noted.

All the C-banding procedures reveal that the microchromosomes are devoid of C-bands. With G-banding, the microchromosomes show the staining intensity as the intercalary bands. The fluorescence banding pattern also reveal that the microchromosomes do not have centromeric heterochromatin. On the other hand, anaphase studies indicate that these chromosomes are regularly distributed during mitosis. Experiments with radioactive precursors suggest that these microchromosomes do not replicate at the fag end of the S-phase, but rather at an earlier period. It is possible that the microchromosomes have functional kinetochores but they do not show C-bands and they are also not AT-rich. In endoduplicated cells the two pairs of sister chromatids remain attached by their centromeres as

the kinetochores do not separate at the previous mitosis. The two microchromosomes are found attached face to face. Three possibilities regarding the nature of the microchromosomes have been discussed. These are (i) the microchromosomes may be fragments which are absent in normal cells but are produced as preparational artifacts, (ii) the microchromosomes may be fragments which are normally present in the cells and become distributed in anaphase being attached to chromosomal ends and/or nucleolar remnants as claimed in case of bandless chromosomes of SEWA mouse ascites tumour and (iii) the microchromosomes have functional kinetochores but not associated with centromeric heterochromatin. However, regular distribution of the microchromosomes, their regular presence in stemline cells and behaviour in endoduplicated cells add more weightage to the later possibility.