

# KARYOLOGICAL STUDIES IN SPOTTED DEER (*Axis axis*)

G. Shanthi<sup>1</sup>, D. Balasubramanyam<sup>2</sup>, P. Thangaraju<sup>2</sup> and R. Srinivasan<sup>3</sup>

Department of Zoology  
Presidency College  
Chennai - 600 002

## ABSTRACT

*The cervidae family is of great interest among the mammalian families because of their dramatic variations in chromosome number. In this paper the karyological characterization of zoo based spotted deer has been attempted. The culture medium RPMI 1640 and pokeweed mitogen was used for the lymphocyte culture. The modal chromosome number 66 (2n) was found. The chromosomal profile of spotted deer showed the presence of 2 submetacentric autosomes (1st pair) and 62 acrocentric autosomes. The XX and XY chromosomal configuration was found in females and males respectively. The position of X chromosome was found between 2<sup>nd</sup> and 3<sup>rd</sup> pair of chromosomes. The 'Y' chromosome was the smallest and sub metacentric.*

**Key words:** Chromosome, Deer, karyology, Cervidae family, Mammals

## INTRODUCTION

India is the second largest country in the world, in its extraordinary forms, because of its unique geographical location and divergent climatic conditions. In India emphasis has been given to cytogenetical studies of domestic animals when compared to wildlife. For the evolution of species, cytogenetics has been recognized as an important tool, besides conventional classification and numerical taxonomy.

Although most of the works, on wild animals, have been carried out in temperate and other tropical countries, very little work has been carried out in India, particularly in south India, among the zoo-based mammalian species. Deer is widely scattered all over the world and differ much in size and phenotype. Likewise there chromosomal complement also differ much from  $2n=6$  to

$2n=70$ . It is apparent that extensive Robertsonian rearrangement that occurred in this species needs more extensive study of animals with known precise origin of location. However the normal fundamental number-chromosome arm is always 70. So it is of interest to characterize the cytogenetical profile in spotted deer (*Axis axis*) under captivity conditions.

## MATERIALS AND METHODS

The blood samples were collected from 12 animals of spotted deer (*Axis axis*) from the Arignar Anna Zoological Park, Vandalur, Chennai - 48. The basic short-term lymphocyte culture technique of Moorhead et al., (1960) with some modifications was adopted. The cultures were set up with 8ml of medium (RPMI 1640), 0.8ml of blood, 2ml of fetal calf serum and 0.2ml of pokeweed mitogen (Sigma) in a 15ml culture vial. The cultures were

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1. Present address: Scientist, Micro therapeutic Research Labs Pvt. Ltd. 64, G.S.T. Road, Guduvanchery – 603 202. Tamilnadu.
  2. Department of Animal Genetics and Breeding, Madras Veterinary College, Chennai – 7.
  3. Retired Professor of Zoology, Presidency College, Chennai – 2.

then incubated at 37° C for 72 hours. One and half hours before 72 hours harvesting of culture 2 drops of Colchicine (1mg/ml of solution) were added in each vial and centrifuge at 1000 rpm for 10 minutes. 8ml of prewarmed 0.075M Potassium chloride was added and incubated at 37° C for 20 minutes. The hypotonic treatment was terminated by adding 2ml of freshly prepared and chilled fixative (3:1 methanol: acetic acid). The contents were centrifuged for 10 minutes at 1000 rpm and supernatant was discarded and kept at 4° C for 20 minutes. The procedure was repeated for three times and after the last centrifugation the fixative and cells were resuspended in 0.5ml to one ml freshly prepared fixative and slides were prepared. Then the slides were stained with 4% Giemsa for 20 minutes, washed with distilled water and air-dried. Stained slides were screened and analyzed under Zeiss photomicroscope and photomicrographs were taken from the slide, Karyogram was prepared after the chromosomes were arranged in pairs in the order of decreasing length of chromosomes and position of centromere as per ISCNA (1989) and the method suggested by Rubini *et al.*, (1990)

### RESULTS AND DISCUSSION

The karyotype analyses of lymphocyte culture revealed a modal diploid chromosomes number of 66 (2n) in both sexes (plate I & II). There was no distinguishable difference between the morphology of chromosomes among the deer subjected to cytogenetical studies. The karyological profile of spotted deer in this study revealed the presence of 32 pairs of autosomes and a pair of sex chromosome. The first pair was submetacentric and 31 pairs were of acrocentric autosomes. The 'X' chromosome was also acrocentric and the position of X chromosome was found between 2<sup>nd</sup> and 3<sup>rd</sup> pairs of chromosomes. The smallest of the submetacentric chromosome was identified as 'Y' chromosome.

The modal chromosomal number in the present study is in agreement with the findings of Hsu and Benirschke (1975) and Robinson and Elder (1993) for *Axis axis*. In Fallow deer similar observation has been made with regard to chromosome morphology. However, the modal chromosomal number is different (2n=68) (Gurstavsson and Sundt, 1968, Gripenberg and Wessman, 1993, Markov 1997). Further studies on the species of deer makes it possible to suggest phylogenetic tree for evolution deer based on karyological variations. In addition, chromosome banding techniques and high resolution banding technique might reveal the close relationship between deer species.

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