Koedoe 21:197–200

CHROMOSOME ANALYSIS IN THE KRUGER NATIONAL PARK: MITOTIC AND MEIOTIC STUDIES IN THE AFRICAN ELEPHANT *LOXODONTA AFRICANA*

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2001

Introduction

The present report is published because of the paucity of publication on the mitotic chromosomes of the African elephant *Loxodonta africana,* and because it is the first study in which the meiotic chromosomes of the species are described.

Material and Methods

Specimens were obtained from two culled male elephants. Bone marrow was aspirated from the sternum of the one elephant and treated according to the technique of Wallace & Fairall (1965). Testicular material removed from the other elephant male was treated as described by Wallace & Fairall (1968). It can here be noted that the bone was extremely hard, leading to difficulty in bone marrow aspiration, and that recovery of the testis was hampered by its intra-abdominal situation.

Chromosome Studies

1. Mitotic

The modal diploid number in 10 suitably spread and stained metaphase plates was 56 per cell. Most of the chromosomes of any individual metaphase were acrocentric of varying size. The largest chromosomes were a pair of submetacentrics with arms of unequal length. There were four small metacentric chromosomes in each metaphase. In addition, each metaphase showed the presence of a single, unpaired, medium-sized metacentric which was tentatively identified as the X chromosome. No Y chromosome was seen. A metaphase from the male elephant is shown in Fig. 1.

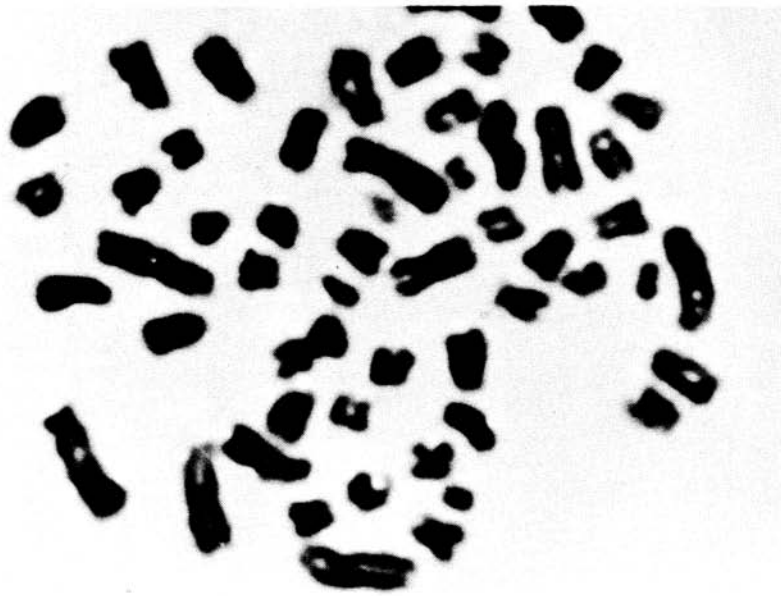

Fig. 1. Metaphase from male African elephant.

2. Meiotic

Most cells observed in the preparations were not dividing. Occasional poorly-fixed and poorly spread pachytene figures were seen, each with a small sex vesicle (Fig. 2).

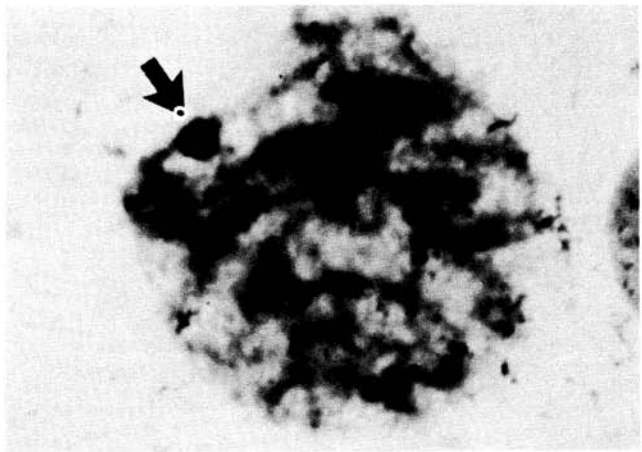

Fig. 2. Pachytene phase of meiosis in male African elephant. Note poor fixation and spreading of autosomes. Small sex vesicle is indicated by the arrow.

First meiotic metaphases were seen occasionally, and these were of poor technical quality. An accurate bivalent count was possible in eight of these, there being a modal number of 28 bivalents. In the first meiotic metaphases examined the X-Y bivalent showed the characteristic end-to-end configuration of most mammals (Fig. 3).

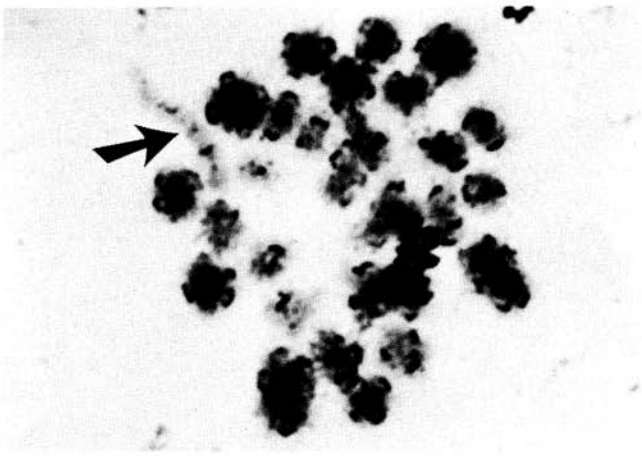

Fig. 3. Poorly fixed first meiotic metaphase from male African elephant. The X-Y (arrowed) shows end-to-end configuration.

Occasional poorly spread second meiotic plates were found, one of which had a chromosome number of 28.

Two mitotic metaphases of rather poor quality were noted in the testicular material, both of which had a chromosome number of 58. Poor spreading and fixation rendered accurate identification of chromosome morphology impossible in these figures.

Discussion

Very few studies have been reported on the chromosomes of the African elephant, perhaps because of the difficulty in obtaining chromosomes for analysis from these large mammals.

The present study confirms the diploid number reported by Hungerford, Sharat-Chandra, Snyder & Ulmer (1966), and Hösli & Thürig (1970). The present study also confirms the general morphology of the chromosomes of the male African elephant reported by Hösli & Thürig (1970). Hungerford *et al.* (1966) reported only on the chromosomes of a female of the species.

The meiotic results here reported are the first to appear on African (or Asiatic) elephants. The diploid number of 56 in the female studied by Hungerford *et al.* (1966) and the male studied by Hösli & Thürig (1970) and a further male in the present study, are confirmed by the finding of a haploid number of 28 in the second male of the present study.

Acknowledgements

I would like to thank the National Parks Board of Trustees for permission to undertake the study and the staff members at Skukuza for their ready help in the field. The study was financed in part by a grant received from the University of the Witwatersrand Senate Research Fund.

REFERENCES

HÖSLI, P. and D. THÜRIG. 1970. The karyotype of the male African elephant: *Loxodonta africana*. *Mammalian Chromosomes Newsletter* II:110–112.

HUNGERFORD, D. A., H. SHARAT-CHANDRA, R. L. SNYDER and F. A. ULMER. 1966. Chromosomes of three elephants, two Asian (*Elephas maximus*) and one African (*Loxodonta africana*). *Cytogenetics* 5:243–246.

WALLACE, C. and N. FAIRALL. 1965. Chromosome analysis in the Kruger National Park with special reference to the chromosomes of the giraffe (*Giraffa camelopardalis giraffa* Boddaert). *Koedoe* 5:97–103.

WALLACE, C. and N. FAIRALL. 1968. Chromosome analysis in the Kruger National Park: a rare translocation chromosome in the kudu. *South African Journal of Medical Science* 33:113–118.