Koedoe (13): *151-155* (1970).

CHROMOSOME ANALYSIS IN THE KRUGER NATIONAL PARK

The Chromosomes of the Spotted Hyaena

Crocuta Crocuta Erxleben

by

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and

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Introduction

The spotted hyaena is a solitary or semi-gregarious nocturnal scavenger commonly found throughout the Kruger National Park (Pienaar, 1963). It is a large powerfully built animal, the back showing a pronounced slope downwards from the shoulders. With the exception of the parous female, differentiation between the sexes can be extremely difficult on external appearances alone and dissection may be required in immature animals to determine the sex (Deane, 1962).

This paper presents the chromosome findings in a male and female spotted hyaena.

Materials and Methods

The animals used in this study were shot in the Kruger National Park for parasitic and other pathological studies as well as for chromosome analysis. As soon as possible after death, bone marrow was squeezed from the dissected sternum and placed in normal saline containing colchicine to a final concentration of 0.02 micro-G/ml. After one hour at room temperature, chromosome preparations were made using the technique previously described (Wallace and Fairall, 1965).

The phenotypic sex of the animals was confirmed at autopsy.

Results

Chromosome number. Table 1 shows the number of chromosomes counted in each cell in the male and female hyaena.

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TABLE 1

	Number of chromosomes per cell							
	36	37	38	39	40	41	42	Total
Male	---	—	1	—	16	—	—	17
Female	—	—	—	1	20	—	—	21

The modal chromosome number in the two animals was 40 chromosomes per cell.

Metaphases. In both animals the chromosomes were mainly submetacentric and acrocentric with some metacentrics.

In the male a number of metaphases examined showed the presence of fairly prominent satellites on two of the smaller submetacentric chromosomes (Fig. 1). A constant finding in male metaphases was a minute unpaired chromosome which gave the impression of being metacentric on direct examination of spreads. The situation of the centromere in this chromosome could not be ascertained with accuracy, however, because of the small size of this chromosome and because of the slight fuzziness of the chromosomes on the slides.

In the female, some of the metaphases examined showed the presence of two small apparently submetacentric chromosomes with prominent satellites as in the male (Fig. 2). No unpaired minute chromosome corresponding with that seen in the male was noted in the female.

Figure 1. *Portion of metaphase, hyaena male. Note the prominent satellites (arrowed).*

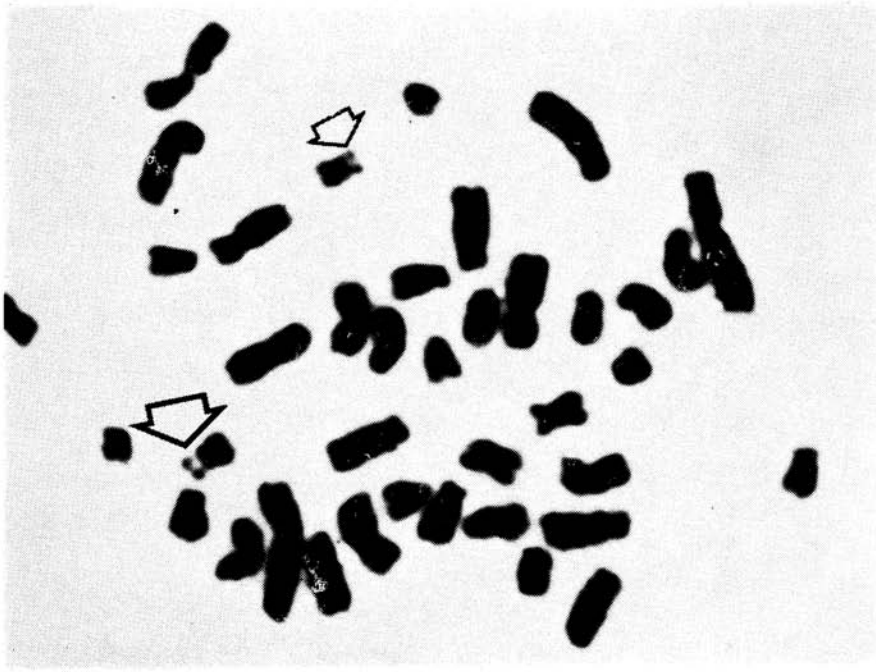

Figure 2. *Portion of metaphase, hyaena female. Note prominent satellites (arrowed).*

Karyotypes. Two metaphases from each animal were fully analyzed and karyotypes prepared. Figure 3 shows a karyotype prepared from the male, and Figure 4 one prepared from the female. Each cell has 38 paired autosomes which are numbered 1–19 in descending order of length. Where possible a tentative number has been given to the autosomal pairs, but in other cases the pairs are placed in groups. Chromosome pair 18 seems to correspond with the prominently satellited chromosomes mentioned previously, but the satellites do not show up to advantage in the karyotypes. These satellited chromosomes resemble the satellited chromosomes described in Felidae (Hsu *et al.* 1963).

The sex chromosomes were identified as a medium-sized pair of submetacentric probable X-chromosomes in the female, and a submetacentric X-chromosome and a minute Y-chromosome in the male.

Discussion

The diploid chromosome number of the spotted hyaena, as shown by the male and female examined, is 40 chromosomes per cell. The sex chromosome status of the male is XY, and that of the female XX. The Y-chromosome is readily identified in the male, but identification of the X-chromosomes of the animals is not as simple. No mosaic state for the

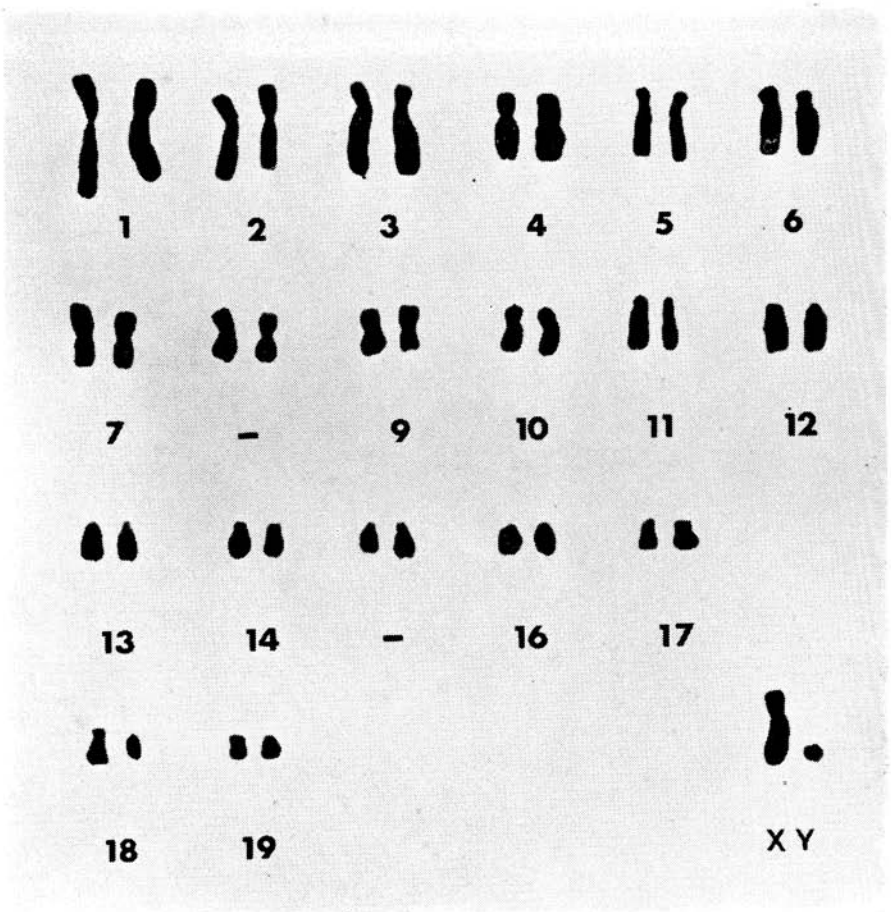

Figure 3. *Karyotype prepared from hyaena male.*

sex chromosomes was present in either animal; such mosaicism, if present, would be readily identified, owing to the characteristic morphology of the Y-chromosome in the male.

Difficulties in identification between sexes in hyaenas on external appearances has occasionally led to the belief that the hyaena is an hermaphrodite (Deane, 1962). However, in the present study the genetic sex of the animals correspond with the gonadal sex as identified on dissection, and no sex chromosome mosaicism was present in either animal. The present study, coupled with the anatomical findings, provides no support for the occasionally held view that the hyaena may be hermaphroditic.

In favourable metaphases, both animals showed two of the smallest submetacentric chromosomes to possess prominent satellites. Further study of the hyaena should show whether the prominent satellites are a

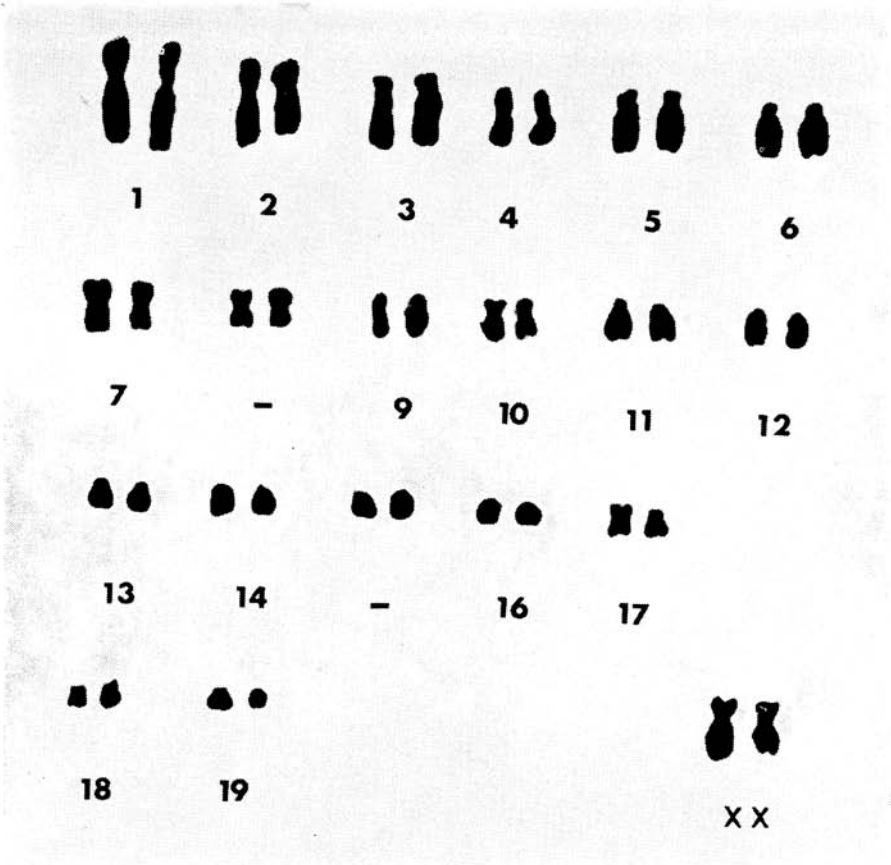

Figure 4. *Karyotype prepared from hyaena female.*

constant feature of the hyaena karyotype, or whether, as in humans, the presence of such satellites can vary with the individual.

Acknowledgements

We would like to express our thanks to the National Parks Board for permission to undertake this study. The study was aided, in part, by a grant received by one of us (C.W.) from the Witwatersrand University Council.

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