CHROMOSOMES OF FIVE ARTIODACTYL MAMMALS

H. SHARAT CHANDRA, DAVID A. HUNGERFORD and JOYCE WAGNER
The Institute for Cancer Research, Fox Chase, Philadelphia

ROBERT L. SNYDER
Penrose Research Laboratory, Zoological Society of Philadelphia
and Department of Pathology, University of Pennsylvania School of Medicine

Received December 19, 1966

Abstract. Somatic chromosomes of six specimens belonging to the following five species of artiodactyls (Artiodactyla: Mammalia) are described: A female nilgai (Boselaphus tragocamelus), 2n = 46; male baresingha (Rucervus duvauceli), two specimens, 2n = 56; a female Himalayan tahr (Hemitragus jemlahicus), 2n = 48; a female Kirk's dik-dik (Rhynchotragus kirki), 2n = 46; and a male sambar (Cervus unicolor), 2n = 58. In the baresingha and the sambar, one or more acrocentric chromosomes carried satellites on their long arms. 3H-thymidine radioautographs of cultured cells of the Himalayan tahr showed a long acrocentric chromosome to be late-replicating, suggesting that it is an X chromosome.

Introduction

Although the chromosomes of domesticated species of artiodactyls have received much attention, those of only a few undomesticated species have been studied by modern methods (AULA and KÄÄRIÄINEN, 1964; McFEE, BANNES and RANY, 1966). The somatic chromosomes of the following six specimens belonging to five undomesticated species are described in this report (Table).

Table

<table>
<thead>
<tr>
<th>Binomial</th>
<th>Common name</th>
<th>Sex</th>
<th>Superfamily</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Boselaphus tragocamelus (PALLAS, 1796)</td>
<td>nilgai</td>
<td>♂</td>
<td>Bovidae</td>
</tr>
<tr>
<td>(2) Rucervus duvauceli (COUVER, 1825)</td>
<td>baresingha</td>
<td>♀</td>
<td>Cervidae</td>
</tr>
<tr>
<td>(3) Rucervus duvauceli (COUVER, 1825)</td>
<td>baresingha</td>
<td>♂</td>
<td>Cervidae</td>
</tr>
<tr>
<td>(4) Hemitragus jemlahicus (H. SMITH, 1827)</td>
<td>Himalayan tahr</td>
<td>♂</td>
<td>Bovidae</td>
</tr>
<tr>
<td>(5) Rhynchotragus kirki (GÜTHER, 1880)</td>
<td>Kirk's dik-dik</td>
<td>♀</td>
<td>Bovidae</td>
</tr>
<tr>
<td>(6) Cervus unicolor (KERR, 1792)</td>
<td>sambar</td>
<td>♂</td>
<td>Cervidae</td>
</tr>
</tbody>
</table>

* After SIMPSON, 1945.

Materials and Methods

Material for tissue culture was obtained at autopsy from the first five animals, all of which were in the collection of the Philadelphia Zoological Society, and by biopsy from the sambar.
1. The nilgai material came from a stillborn animal (acquisition number 51M) which apparently died of classic tetralogy of Fallot. It was one of triplets born in October, 1964; of the remaining two, one is alive and well while the other was an aborted fetus which had been partially resorbed. No data are available on the geographic origin of these specimens. It is known, however, that this species is found only in peninsular India, particularly in the central areas (Walker, 1964).

2. Baresingha. Two male specimens were studied. One of them (84M) was a week old while the other (108M) was three days old at the time of death due to accidental injury. They were part of a colony which had been bred from a pair brought to the Philadelphia Zoo nine years ago. The stock originated from India.

3. Himalayan tahr. This year-old female specimen (37M) at the Philadelphia Zoo also died of injury. She was part of a 50-year-old colony that has been bred from two females and one male.

This species is reported to occur in most of the Himalayan mountain range from Kashmir to Sikkim and possibly farther eastward as well.

4. Kirk's dik-dik. This specimen (71M) is said to have originated in east Africa. It was an adult male which died of accidental poisoning.

5. Sambar. This was a young calf (14M) which had been donated to Sri Chamarajendra Zoological Gardens in Mysore, India. It had been captured in a forest south of the city of Mysore. The rim of the outer ear was biopsied and the tissues were sent by jet air freight to Philadelphia.

Cultures of fibroblast-like cells were established from solid tissues of these animals and slides prepared according to the methods of Hayflick and Moorhead (1961). For the nilgai, baresingha and the dik-dik hypotonic KCl (0.075M at 37°C; Hungerford, 1965) was substituted for serum in the prefixation treatment of cells. Chromosomes were studied in early tissue culture passages, never later than in the fourth.

The uptake of tritium-labelled thymidine by the chromosomes of the tahr was investigated by the usual radioautographic methods. 3H-thymidine (Schwarz Bioresearch Inc., Orangeburg, New York; specific activity 1.9 c/m mole) was added at a final concentration of 0.5 μc/ml of medium four hours before cultures were terminated. Colchicine (0.2 μg/ml of medium) was added about ten minutes after the addition of 3H-thymidine. Kodak AR-10 stripping film was applied to the slides and exposed for 10 days at refrigerator temperature.

Results

The chromosome number of the nilgai was found to be 46 (Fig. 1). The three largest pairs were recognized as distinct from the rest of the complement and from one another. The next largest chromosomes are two closely similar pairs of chromosomes with median centromeres. Pair number 6 is a smaller submedian pair and pair number 7 is smaller still and submedian. The remainder of the complement is a series of acrocentric chromosomes with no obvious morphological discontinuities. Pair number 3 has a pronounced secondary constriction in the short arm near the centromere. The X chromosomes have not been identified.

Both specimens of the baresingha were found to have a modal chromosome number of 56 (Figs. 2, 3). The autosomal complement falls into two