Somatic chromosomes of black-headed oriole, *Oriolus xanthornus* (Linn.): A probable case of translocation heterozygosity

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Summary. 2n = 80. There are 7 pairs of macrochromosomes in the male karyotype. In 2 females, besides the sex chromosomes, chromosome 3 and the largest microchromosome are unpaired and there is an additional large unpaired macrochromosome. This aberrant karyotype is best interpreted in terms of a reciprocal translocation heterozygosity, in all likelihood, at the population level.

Very few chromosomal polymorphisms involving mutual translocations, other than fusions and dissociations, are known in animals. Several species of birds are found to be chromosomally polymorphic for pericentric inversions at the population level[2-7], while a single species, *Megalaima zeylanica,* displays translocation polymorphism at least in 1 natural population[8]. Some cases of spontaneous and induced translocations in birds are also on record[9-13]. During the course of routine karyotyping, we came across another case of translocation heterozygosity in 2 females of black-headed oriole, *Oriolus xanthornus* (Linn.), a passerine bird belonging to the family Oriolidae. The bird is a resident, sporadic in occurrence.

Chromosomal data presented here are based on bone marrow cells derived from 1 male and 2 female birds. The nomenclature of the chromosomes is according to the system proposed by Levan et al.[14]. In the 3 individuals examined, 2 distinct karyotypes were encountered. A description of the homozygous karyotype found in the male, designated AB/AB, CD/CD is followed by a brief description of the heterozygous karyotype, designated AB/AD, CB/CD, which was found in both the females examined. As no homozygous female karyotype has been studied, the assignment of Z and W chromosomes is arbitrary and based only on homologies with the congeneric species *Oriolus oriolus*[15].

1. Homozygous karyotype (AB/AB, CD/CD): The diploid chromosome number is 80. 7 pairs of macrochromosomes are sharply demarkated from 33 pairs of microchromosomes (figures 1 and 3). The largest chromosome pair is submetacentric. The 2nd pair, considerably smaller, is subtelocentric. Pair 3, designated AB, is slightly smaller than pair 2. Its relative length (L^R) is 15.40% of the total macrochromosome length. It has a very minute short arm which is not visible in condensed plates. The Z chromosome, again a submetacentric, is 4th in size and is less mediocentric than chromosome pair 1. Pairs 5-7 are telocentrics of gradually decreasing sizes. The largest microchromosome is designated CD.

2. Heterozygous karyotype (AB/AD, CB/CD): Both the females studied show a karyotype different from that of the male reported here. A comparison of the 2 karyotypes (figures 1 and 3) reveals that chromosomes 1, 2, 5, 6, 7 and the Z correspond in the homozygous and heterozygous conditions. A biarmed medium-sized microchromosome is tentatively identified as the W chromosome. Besides in the female, there are 2 non-matching macrochromosomes AB

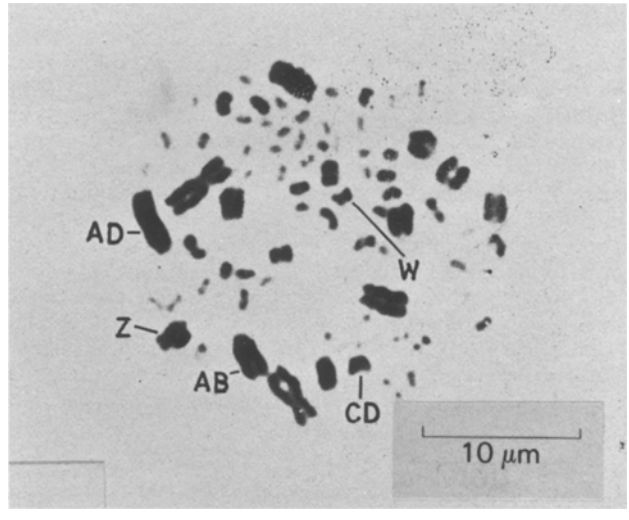

Fig. 2. Female metaphase plate.

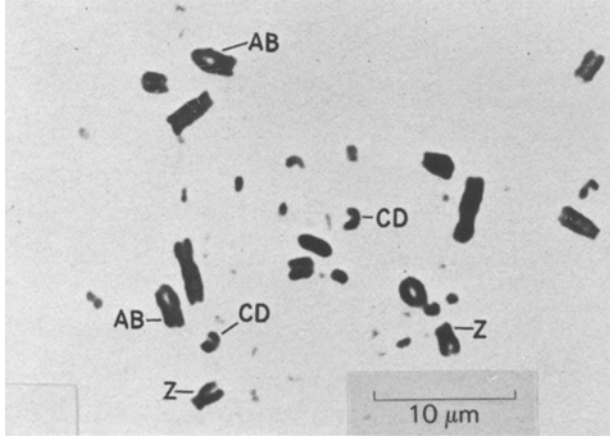

Fig. 1. Male metaphase plate.

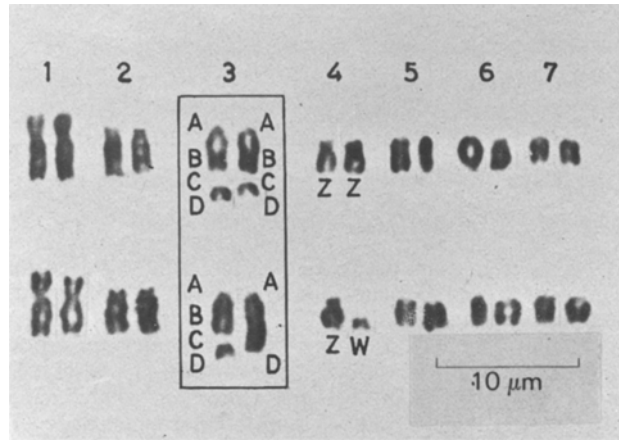

Fig. 3. Partial karyotype of male (upper row) and female (lower row). The chromosomes involved in translocation are given in the rectangle.

and AD, and the largest microchromosome (CD) is also single. The smaller of the single macrochromosomes designated AB ($L^R = 14.27\%$) corresponds to chromosome pair 3 of the homozygous karyotype. The larger (AD) has no counterpart in the homozygous karyotype. It is also a telocentric element considerably larger than AB. The combined relative length of chromosomes AB and CD slightly exceeds that of chromosome AD (AB+CD=20.47%; AD=20.28%).

In our opinion, such a heterozygosity can most reasonably be explained on the assumption of the occurrence of a reciprocal translocation between chromosomes AB and CD giving rise to chromosomes AD and CB. No microchromosome corresponding to the hypothetical small derived microchromosome CB could be identified. Besides the 2 karyomorphs described here, individuals with chromosomal constitution AD/AD, CB/CB should occur. But no further specimens of the species became available.

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The karyotype of *Microtus cabrerae* Thomas, another species with giant sex chromosomes

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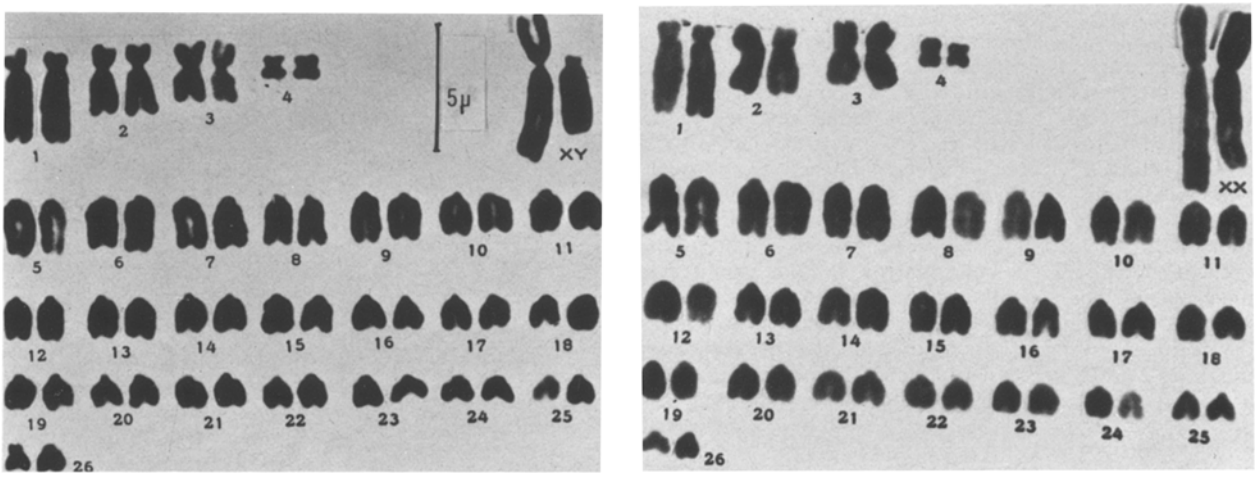
Summary. The karyotype of *Microtus cabrerae,* a species endemic to Spain, is described. It comprises 2n=54 chromosomes, with a 'fundamental number' of 64, and with very large sex chromosomes. An evolutionary relationship between this species and *M. chrotorrhinus* is suggested.

The chromosome complements of species of the genus *Microtus* have been studied mainly by Matthey[1-3] Sachs[4], Hansen-Melender[5,6] and Meylan[7,8]. Some of the species belonging to this genus have not been cytologically analyzed. This report presents observations on *Microtus cabrerae* Thomas, 1906, a species endemic to the Iberian Peninsula, that has not previously been studied.

6 animals (2 male and 4 female), trapped live in the region of Sierra Cazorla (Jaén, Spain) were studied. Somatic metaphases were obtained from bone marrow[9]. From each animal, at least 20 well-spread metaphases were studied. Chromosomes were characterized by the position of their centromeres and classified according to the nomenclature suggested by Levan et al.[10]. Karyotypes were constructed following the criteria given by Tjio and Levan[11].

All the individuals analyzed displayed a diploid chromosome number 2n=54 (figure). Their karyotype consists of 3 pairs of big submetacentrics (pairs 1, 2 and 3) with a centromere index of 4.4, 2.0 and 1.5 respectively, 1-pair of small metacentrics (pair 4), and 22 pairs of acrocentrics showing gradual differences in size. The main feature of the karyotype is the presence of giant sex chromosomes. The X is a submetacentric chromosome with a centromere index of 1.8 and constituting 11.7% of the female haploid



Karyotypes of *Microtus cabrerae* Thomas, 1906, with 2n=54 chromosomes and 'nombre fondamental' = 64. Left, male karyotype. Right, female karyotype.