(2) that the 2 populations are interconnected by the same system that is responsible for the ubiquitous diffusion of the species, which is that associated with the black rat's condition as man's commensal. It is not improbable that some rats of Mediterranean Europe may even have reached America with . . . Christopher Columbus!

*Riassunto.* In una popolazione italiana di *Rattus rattus* L. è stato messo in evidenza un cariotipo a 38 cromosomi; la differenza nel numero diploide rispetto a quanto noto per altre popolazioni della stessa specie è dovuta a due fusioni centriche in condizione omozigote. Il confronto con i cariotipi forniti da altri autori per la specie *Rattus rattus* ci fa proporre anche per questa specie di Roditori la presenza di un fenomeno di polimorfismo cromosomico.

E. Capanna, Maria Vittoria Civitelli and R. Nezer

*Istituto di Anatomia Comparata «B. Grassi» dell'Università di Roma, Via Borelli 50, I-00161 Roma (Italy), 8 November 1969.*

## Chromosome Polymorphism in Deer Mouse Siblings (*Peromyscus maniculatus*)

Earlier chromosome studies demonstrated an unusual chromosome polymorphism both within and between subspecific members of *Peromyscus maniculatus*[1–4]. Although multiple balanced chromosome translocations have not been completely ruled out, most authors favor the explanation of pericentric inversions as probably representing the basic mechanism for the chromosome polymorphism. However, these inversions may be complemented in some animals by variation due to the matings of animals with different karyotypes. The present study indicates that sibling offspring of the same parents also demonstrate this chromosome polymorphism.

*Materials and methods.* The animals used for this study are from a colony of *Peromyscus maniculatus* maintained at the University of Washington; the animals in the colony have resulted from free interbreeding among members of the pure subspecies *Peromyscus maniculatus rubidis*, *Peromyscus maniculatus gambelli*, and *Peromyscus maniculatus sonoriensis* over a period of several years. A total of 14 offspring from multiple matings between 2 of these colony animals had successful chromosome analysis. The routine chromosome studies on these animals utilized the microtechnique for culturing leukocytes from whole-blood as previously described[5].

*Results.* For ready comparison between animals, the chromosomes are placed into 3 groups as previously described: (A) large submetacentric chromosomes; (B) acrocentric chromosomes; and (C) small submetacentric and metacentric chromosomes[3]. Within each group the chromosomes are arranged in decreasing size. Examination of the representative karyotypes in Figures 1, 2 and 3 suggests that a number of the chromosomes can be paired on the basis of size and morphology, while others cannot. Since the acrocentric chromosomes are most readily distinguished, the primary comparisons among the animals are based upon the acrocentric number, as summarized for the 14 siblings in the Table. The father of these animals had 15 acrocentric chromosomes and 10 large submetacentric chromosomes. The studies on the mother were unsuccessful.

The number of acrocentric chromosomes varies from 12–15 in the females and 14–16 in the males (see Table). The number of the large metacentric chromosomes in Group A appears to vary from 9–11. Since the chromosome number was constant at 48 in all animals examined, the relative proportion of the chromosomes in each group will vary if the chromosome complement within one group, such as the B (acrocentrics), varies. However, because of the difficulty in establishing where the A group ends and the C group begins in some instances, no specific conclusions were attempted for these groups. The sex chromosomes could not be specifically identified in all animals and therefore are not marked in the figures.

*Discussion.* The findings in the present study confirm a constant diploid chromosome number of 48 for *Peromyscus maniculatus*. The results also indicate that the previously described chromosome polymorphism can be seen among closely related animals (siblings). While some differences between animals of different sexes can be attributed to the sex chromosomes, the full extent of the chromosome variance between male and female as well as the differences within each sex cannot be attributed to this explanation.

These results do not give a further insight into the possible etiology of the observed chromosome polymorphism, although they are consistent with the abovementioned pericentric inversion possibility. If the chromosome studies had been successful on both parents of these animals, it might have been possible to determine that the chromosome differences among the animals could be

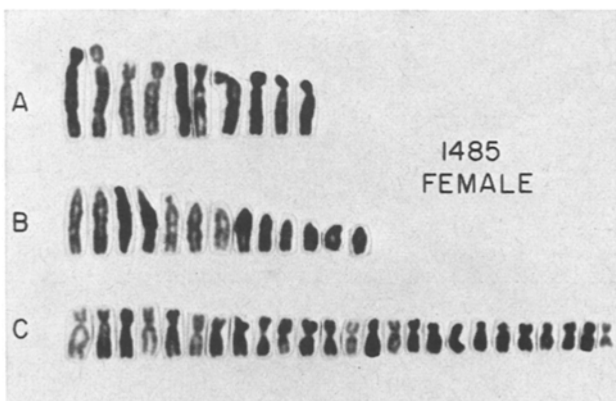


Fig. 1. Animal 1485 is female and has 13 acrocentric chromosomes (B Group). On the basis of size alone the distinction between the smallest A Group chromosome and largest C Group chromosome is not clear, but on comparison with other animals they seem to fit best as illustrated.

[1] S. Ohno, C. Weiler, J. Poole, L. Christian and C. Stenius, Chromosoma *18*, 177 (1966).
[2] R. P. Singh and D. B. McMillan, J. Mammal. *47*, 261 (1966).
[3] R. S. Sparkes and D. T. Arakaki, Cytogenetics *5*, 411 (1966).
[4] T. C. Hsu and F. E. Arrighi, Cytogenetics 7, 417 (1968).
[5] D. T. Arakaki and R. S. Sparkes, Cytogenetics *2*, 57 (1963).

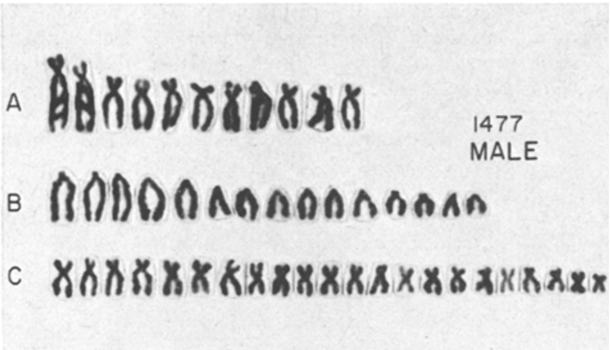


Fig. 2. Animal 1477 is male and has 15 acrocentric chromosomes (B Group). The difference between the A and C Groups of chromosomes seems distinct.

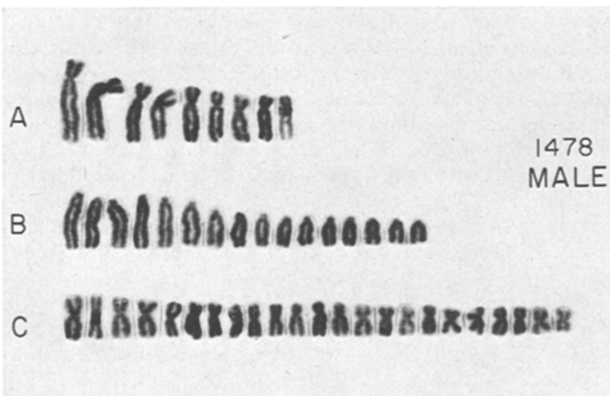


Fig. 3. Animal 1478 is male and has 16 acrocentric chromosomes (B Group). The distinction between the smallest A Group chromosome and largest C Group chromosome seems clear on morphology but less clear on size alone.

Acrocentric chromosome numbers related to sex of the 14 sibling deer mice

| Sex | Number of acrocentric chromosomes 12 | 13 | 14 | 15 | 16 |
|---|---|---|---|---|---|
| Male | – | – | 1 | 2 | 2 |
| Female | 1 | 1 | 3 | 4 | – |

simply due to the inheritance of homologous chromosomes of different morphology from each of the parents. However, this probably would not be the case because of the difficulty in identifying homologous chromosomes when they have a different morphology.

HSU and ARRIGHI[4] have suggested that errors in pairing could account for an apparent greater polymorphism than actually exists, since they had no difficulty in establishing homologous pairs. While we do not rule out such possible errors in our own studies, we feel that the acrocentric chromosomes can be readily distinguished from the non-acrocentrics and have limited the polymorphism to differences in the number of acrocentrics. Thus, our presentation probably represents the minimal variation because it seems likely the chromosome changes probably also affect the other chromosomes. Although HSU and ARRIGHI[4] feel confident in assigning the sex chromosomes in the animals they studied, we have some reservation about this on the basis of our own studies as well as the lack of firm evidence that the sex chromosomes are not involved in the polymorphism. Clearly, more extensive and detailed mitotic and meiotic studies as well as autoradiographic chromosome studies should help to resolve these questions.

These results more firmly establish the existence of chromosome polymorphism in *Peromyscus maniculatus* which has now been observed to include sibling animals[6].

*Zusammenfassung*. Früher wurde bereits ein Chromosomenpolymorphismus in nicht verwandten *Peromyscus maniculatus*, wahrscheinlich durch perizentrische Inversion bedingt, gezeigt. Es wird nun nachgewiesen, dass dieser Polymorphismus auch unter Geschwistern vorkommt.

D. T. ARAKAKI[7], IRIS VEOMETT and R. S. SPARKES

*Cytogenetics Laboratory, Kapiolani Maternity Hospital, Honolulu, Hawaii (DTA), and Departments of Medicine and Pediatrics, UCLA School of Medicine, Los Angeles (California, 90024, USA), 3 November 1969.*

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[7] Current address for DAVID T. ARAKAKI: Genetics Laboratory, Kinderspital Zürich, Steinwiesstrasse 75, 8032 Zürich (Switzerland). Send reprint requests to R. S. Sparkes in Los Angeles.

## Polymorphism in the Somatic Chromosomes of *Neotoma micropus* Baird, the Plains Woodrat[1]

In their karyological survey of the rodent genus *Neotoma*, BAKER and MASCARELLO[2] examined 33 specimens of the plains woodrat, *Neotoma micropus* Baird, and found several individuals whose karyotypes varied from the one described for the species by HSU and BENIRSCHKE[3]. We have examined 67 additional specimens and in the present communication, data from 100 specimens are presented.

*Material and method*. All specimens were collected from natural populations. Data concerning localities are given in Tables I and II. Voucher specimens of animals are deposited in the Texas Tech University Collection of Mammals. The method used to prepare slides were

[1] Supported in part by an American Philosophical Society Grant from the Penrose Fund and a Texas Tech University Faculty Grant.

[2] R. J. BAKER and J. T. MASCARELLO, Cytogenetics *8*, 187 (1969).

[3] T. C. HSU and K. BENIRSCHKE, in *An Atlas of Mammalian Chromosomes* (Springer-Verlag, New York 1968), vol. II.