Robertsonian Fusion Between Homologous Chromosomes in a Natural Population of the Least Cotton Rat, *Sigmodon minimus* (Rodentia, Cricetidae)

Robertsonian fusion (fusion of 2 acrocentric chromosomes to form a metacentric) is a common process of chromosomal evolution. Usually this takes place between 2 non-homologous chromosomes. The present communication reports a case of a fusion between 2 homologous chromosomes in a natural population of a rodent, *Sigmodon minimus* Mearns.

A total of 13 specimens of this species were collected in New Mexico, USA. 7 of them were trapped in the vicinity of Silver City in 2 consecutive years: 3 in 1967 (specimen Nos. 661 ♀, 600 ♂ and 662 ♂) and 4 in 1968 (specimen Nos. 805, 806, 819 and 820, all ♂♂). The 3 specimens in 1967 were litter mates whose mother died in captivity. The remaining 6 were collected 5 miles south of Bernalillo, Sandoval Co., Oct., 1967 (specimens 873, 874, 876, 877, ♀♀; 872 and 875, ♂♂).

Cytological preparations from lung cultures and/or bone marrow were made from all specimens. In 3 males from Silver City, testicular squashes were made to check chromosomal configurations from both spermatogonia and spermatocytes.

All 6 specimens from Bernalillo and 1 male specimen from Silver City showed a diploid number of 30. The autosomes are composed of 2 pairs of relatively small metacentrics, 11 pairs of acrocentrics of varying sizes, and 1 pair of minutes. The minute chromosomes are distinctly biarmed in good populations. The male specimens have 2 unmatched chromosomes which are presumed to be the sex pair. The *X* is a medium-sized acrocentric, and the *Y*, a small acrocentric slightly larger than the minute autosomes (Figure 1).

The remaining specimens from Silver City (1 ♀ and 5 ♂♂) showed a diploid number of 29 (Figures 2 and 3). A relatively large metacentric chromosome is found in place of 2 acrocentrics. This configuration was found in lung cultures, bone marrow in situ, as well as spermatogonia. A presumption is made that this metacentric element is a fusion product between 2 acrocentrics. The identity of the 2 elements which fused to form the metacentric was revealed in meiosis. If they were non-homologous chromosomes, 13 bivalents and a trivalent should

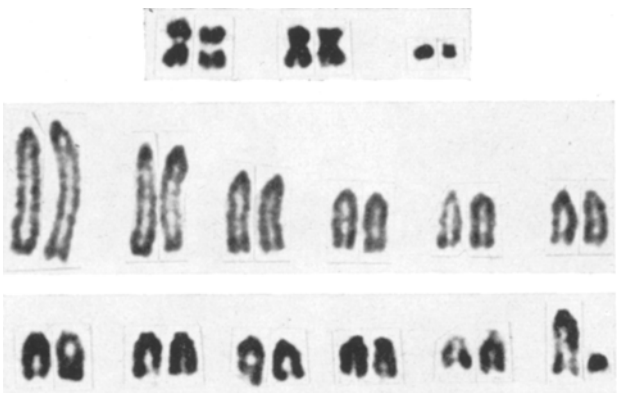

Fig. 1. A male karyotype of *Sigmodon minimus*, showing 30 chromosomes. Both sex chromosomes are acrocentric.

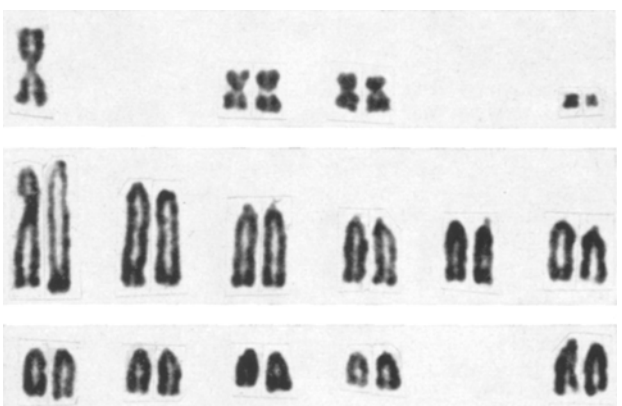

Fig. 2. A male karyotype of *Sigmodon minimus*, showing 29 chromosomes. Note the medium-sized metacentric.

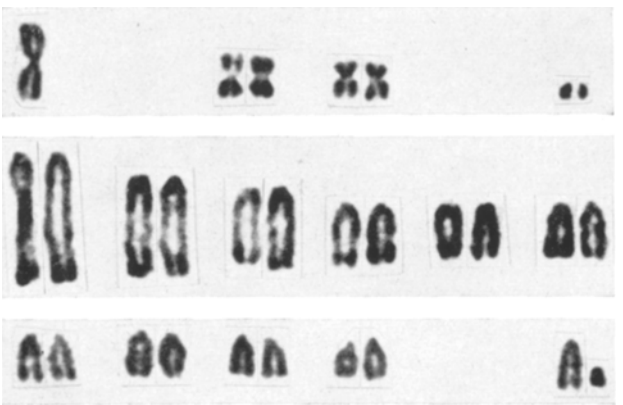

Fig. 3. A female karyotype of *Sigmodon minimus*, showing 29 chromosomes. Note the medium-sized metacentric.

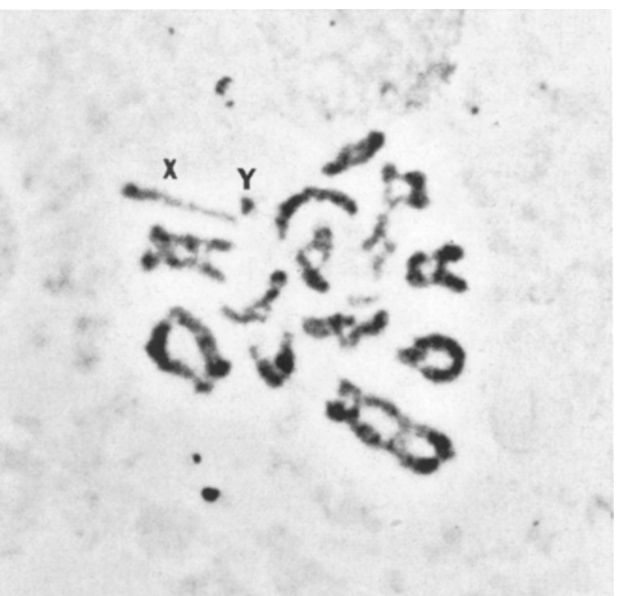

Fig. 4. A diakinesis figure showing 15 bivalents, taken from a male specimen with 29 chromosomes.

be expected in diakinesis and metaphase I. If they were homologous, 15 bivalents would be expected. Figure 4 shows a spermatocyte with 15 bivalents. From over 60 diakinesis figures examined, no deviation from 15 bivalents was observed.

The Robertsonian fusion in the present case, therefore, is believed to involve a pair of homologous acrocentrics. Theoretically, such a translocation should result in 50% sterility. It is interesting to note that this anomaly was found in 2 separate collections exactly 1 year apart. Furthermore, only 1 animal with the presumed normal constitution (30 chromosomes) was found among 7 individuals examined from Silver City, indicating that animals with this anomaly not only survive, but possibly predominate in the population in question[1].

Zusammenfassung. Die diploide Chromosomenzahl von *Sigmodon minimus*, einem Nager der Familie der Cricetiden ist 30. Im Karyotyp befindet sich kein grosses metazentrisches Chromosom. Bei Tieren aus einer Population von Silver City, New Mexico, wurden 29 Chromosomen gefunden. Eines davon war relativ gross und metazentrisch. Beim Paaren der Chromosomen in Meiose ist es evident, dass das metazentrische Chromosom das Fusionsprodukt von 2 homologen Chromosomen ist.

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Antagonism of Polymyxin B and Kanamycin Sulfate by Liquoid (Sodium Polyanetholsulfonate) in vitro

Sodium polyanetholsulfonate (Liquoid®), a synthetic anticoagulant, has been used in media for human blood cultures, since it is known to be anticomplementary and antiphagocytic[1-8]. During the course of experiments involving the interaction of bactericidal antibiotics and the bactericidal activity of fresh human serum in vitro, it was found that Liquoid not only abolished the bactericidal activity of serum, but, in addition, greatly reduced the activity of kanamycin sulfate and polymyxin B against Gram-positive as well as Gram-negative organisms. This preliminary report briefly describes our results obtained with the broth dilution technique. Liquoid did not influence the activity of ampicillin, tetracycline, cephalothin, or chloramphenicol; its inhibitory effect thus far has been found to be limited to kanamycin sulfate and polymyxin B. Tables I and II summarize our findings with regard to the latter 2 antibiotics. Kanamycin sulfate was obtained through the courtesy of the Bristol Laboratories, Syracuse, N.Y.; polymyxin B was a gift from Chas. Pfizer and Co., Inc., New York City, N.Y.; Liquoid was generously provided by Hoffmann-La Roche, Inc., Nutley, N.J. Four different broths were employed: nutrient broth (Difco), Mueller-Hinton broth (Difco), trypticase soy broth (BBL), and thioglycollate broth with 0.5% added dextrose (Difco); the latter 2 media are commonly employed for the culture of human blood. The data presented in Table I show that Liquoid raised the minimal inhibitory concentrations (MIC's) of kanamycin (expressed in μg/ml) considerably, in nutrient broth and Mueller-Hinton broth. However, this effect was absent or considerably reduced in the case of trypticase soy broth and thioglycollate broth, raising the question of whether the results obtained with Liquoid in the former 2 media were media-dependent. However, the addition of 10% fresh serum to all 4 media resulted in an enhanced antagonistic effect of Liquoid, particularly in the case of trypticase soy broth and thioglycollate broth. When polymyxin B (concentrations expressed in units/millilitre; 10 U = 1 μg) and Liquoid were examined (Table II), there was a clear-cut antagonism between the 2 substances in all 4 media tested, regardless of whether they had been enriched with 10% fresh serum or not. It may be added that Liquoid, in concentrations of 0.05–0.0125%, was found to inhibit the 2 antibiotics in question. All results were reconfirmed using new lots of antibiotics, Liquoid, and media, as well as different strains of test organisms.

These data suggest that Liquoid will be a useful antagonist against kanamycin and polymyxin B in blood cultures from patients receiving these drugs, since Liquoid raised the MIC's of the 2 antibiotics to levels considerably above those obtained with any single medium alone.

It is of interest to note that Liquoid antagonizes 2 different antibiotics with different mechanisms of action. Kanamycin is known to inhibit bacterial protein synthesis, whereas polymyxin B acts at the bacterial cell membrane through its surface-active properties[9].

A thorough search of the literature during the completion of this manuscript indicated[10] that Liquoid had been found to exert a slight antagonistic effect against streptomycin, diminishing its activity from 2- to 8-fold when 0.05–0.2% of Liquoid had been employed. Furthermore, it had been found previously[11] that Liquoid at a

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