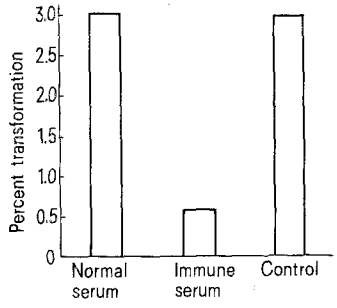
competence-provoking factor has acted on noncompetent cells, Pakula hypothesized that the action of the competence-provoking factor may involve either unmasking of a hidden, preexisting antigen, or synthesis de novo of antigen. TOMASZ and BEISER[4] found that prepared antisera against pneumococci, in their competent state, inhibited DNA-mediated genetic transformation as well as binding of radioactive DNA by the cells. The purpose of this investigation was to attempt to inhibit transformation of protrophy of a lys⁻ mutant of *Neisseria catarrhalis* by specific agglutinins against whole cells.

*Materials and methods.* Antibody against *N. catarrhalis* strain NE-11 was prepared by injecting a formalin-killed washed suspension intravenously into rabbits 4 times a week for a total of 4 weeks. Blood was collected from rabbits by way of the marginal ear vein 7–10 days after the final inoculation of the vaccine.

*N. catarrhalis* auxotrophic mutant was prepared for adsorption in the same manner as described for transformation by OTERO[5] except that calf serum was not added to the transformational mixture. The pretransformational suspension of cells were exposed to 0.5 ml of undiluted immune serum for 1 h at 42 °C prior to the addition of wild-type DNA. After the period of adsorption, transformational procedures and frequencies were performed in the same manner as described by OTERO[5].

*Results and discussion.* The results show that a loss of transformants, approximately 80%, in the immune serum occurred (Figure). There appears to be little activity in the normal serum against *N. catarrhalis* NE-11 lys⁻. These results indicate that a specific substance present on the surface of the cell which was blocked (the cell viability of antibody exposed cells was the same as unexposed control cells) by specific agglutinins is essential in allowing the penetration of WT DNA.




Loss of transformants in the immune serum.

*Zusammenfassung.* Antikörper mit einer gegen kompetente *N. catarrhalis* gerichteten Spezifität vermindern deren Transformationshäufigkeit bedeutend. Diese Beobachtung könnte auf die Existenz von Membranrezeptoren für transformierende Wildtyp-DNS hinweisen.

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## Chromosome Analysis and Meiotic Behaviour of *Pappogeomys* (Cratogeomys) *merriami merriami*

The study of the geographic variability in fossorial rodents from the cytogenetic point of view, is of special interest because of the particular mode of life, which allows different types showing severe isolation and expressive variations of the chromosome complement both inter and intraspecifically, as described in several genera: Spalax[1–6], Ctenomys[7,8], Thomomys[9–13], Geomys[14] and Pappogeomys[15]. The aim of this paper is to report the first results of cytogenetic analysis of fossorial rodents restricted to the transverse volcanic system of México (Valley of México), initiated by the *Merriami* group of *Pappogeomys* (Cratogeomys): *Pappogeomys merriami merriami* located at the SE of the Valley.

*Material and methods.* A total of 8 specimens of *Pappogeomys* (Cratogeomys) *merriami merriami* (4 males and 4 females) collected at the National School of Agriculture, Chapingo, México State, were analyzed. The animals were injected with 1.0 ml/100 g body weight of a 0.04% colchicine solution and 2.30 h after they were sacrificed. Chromosome spreads from bone marrow, spleen and testes were obtained and permanent slides were prepared following the routine techniques[16,17]. In each animal no fewer than 30 metaphases from each processed tissue were analyzed. The chromosome classification was made according to LEVAN et al.[18] and AL-AISH[19] criteria.

*Results.* The speciemens of *Pappogeomys merriami merriami* studied showed a diploid chromosome number $2n = 36$ and a fundamental number NF = 66. The complement shows 17 pairs of autosomes (16 pairs were biarmed and only 1 pair was acrocentric): 4 pairs of sub-

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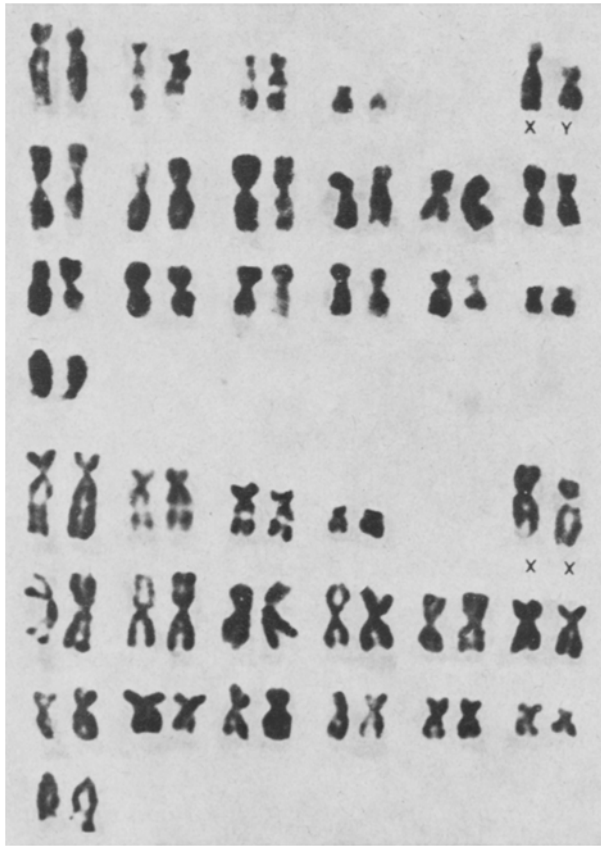
metacentric chromosomes 2 of them showing a secondary constriction in the long arm; 12 pairs of metacentric chromosomes and a pair of acrocentric ones, also showing a clear constriction. The *X*-chromosome is among submetacentric one and the *Y*-chromosome is a medium-sized metacentric one (Figure, Table).

During meiosis, at pachytene, the homologues form 13 to 15 bivalent rings and one or possibly 2 quadrivalent rings. The heterochromosomes show a very small terminal pairing segment allowing the formation of an end-to-end *X-Y* complex.




Karyotype of *Pappogeomys merriami* male and female.

Relative values for chromosone identification in *Pappogeomys merriami merriami*

| Chromosome number | Relative length | Arm ratio | Classification |
|---|---|---|---|
| 1 | 85.90 | 2.58 | sm |
| 2 | 63.90 | 1.83 | sm |
| 3 | 53.00 | 1.81 | sm |
| 4 | 28.70 | 1.67 | sm |
| 5 | 76.80 | 1.21 | m |
| 6 | 73.10 | 1.41 | m |
| 7 | 69.00 | 1.39 | m |
| 8 | 61.40 | 1.48 | m |
| 9 | 57.60 | 1.31 | m |
| 10 | 55.50 | 1.28 | m |
| 11 | 53.00 | 1.33 | m |
| 12 | 50.20 | 1.54 | m |
| 13 | 48.60 | 1.30 | m |
| 14 | 45.30 | 1.39 | m |
| 15 | 41.10 | 1.40 | m |
| 16 | 31.60 | 1.35 | m |
| 17 | 42.40 | — | t |
| *X* | 62.70 *x* | 1.79 | sm |
| *Y* | 47.40 | 1.36 | m |

*Discussion.* According to *Laguarda* et al.[20], *Pappogeomys* (Cratogeomys) *merriami merriami* is a highly evolved subspecies, since it shows 36 chromosomes and only 1 pair of them is acrocentric, all others being bi-armed ones. On the other hand, this is the species showing the lower chromosome number of the familiy Geomydae just reported.

It is impossible to state, at present, whether the actual karyotype of *Pappogeomys merriami merriami* was evolved by Robertsonian processes or by pericentric inversions, because we have not yet any data on karyotype of other species or subspecies of the subgenus Cratogeomys from the transverse volcanis system.

The idiogram of *Pappogeomys merriami merriami* with $2n = 36$ and NF = 66 is very different from the karyotypes reported by BARRY and BAKER[15] for both northern and southern groups of *Pappogeomys castanops*: the northern (Colorado, New Mexico, Texas, Chihuahua, Coahuila and Durango) with $2n = 46$ and NF = 86, and the southern group (Nuevo León, San Luis de Potosí and Zacatecas) with $2n = 42$ and NF = 78. The specimens of the transverse volcanic system showed 10 chromosomes (5 pairs) less than the northern group and 6 chromosomes (3 pairs) less than the southern one. Moreover, in the karyotype of *Pappogeomys merriami merriami*, there are no subtelocentric chromosomes, as in the karyotype os *Pappogeomys castanops*, and the *Y*-chromosome in the former is biarmed while in the latter it is an achrocentric one.

On the other hand, *Pappogeomys merriami is quite* different from *Pappogeomys fumosus* (from Colima), *P. tylorhinus* (from Hidalgo, Colima and Michoacan), *P. zinseri* (from Jalisco) and *P. gymnurus* (from Jalisco and Michoacan), reported by BERRY and BAKER[15] too, because these 4 species show $2n = 40$ and NF = 76. Moreover, they do not show an acrocentric chromosome, like *P. merriami merriami*, while they show subtelocentric chromosomes which *P.m. merriami* lacks.

From the cytogenetic point of view, the data here reported reflect the divergence of the evolutionary line of *P. merriami merriami* from that of other species of the genus[21].

*Resumen. Pappogeomys merriami merriami* presenta $2n = 36$; NF = 66, contando apenas con un par de acrocéntricos, siendo el *Geomydae* con menor número de cromosomas. Durante la meiosis existen 13 a 15 bivalentes y un complejo *X-Y* en tánden.

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