https://doi.org/10.26749/rstpp.104.79

PAPERS AND PROCEEDINGS OF THE ROYAL SOCIETY OF TASMANIA, VOLUME 104

[*Manuscript received 26 August 1969*

THE CHROMOSOMES OF SOME TASMANIAN RODENTS

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(With six plates and one table)

ABSTRACT

The karyotypes of three species of Tasmanian rodents, *Rattus lutreolus* Grey, 1841 (2n=42), *Pseudomys higginsi* Trouessart, 1897 (2n=48), and *Hydromys chrysogaster* Geoffrey, 1804 (2n=48), are described and illustrated. The most successful preparation method, from bone marrow, is described and the results discussed in the light of other published results.

INTRODUCTION

This paper presents the karyotypes of three species of indigenous Tasmanian rodents, *Rattus lutreolus* Grey, 1841 (2n=42), *Pseudomys higginsi* Trouessart, 1897 (2n=48), and *Hydromys chrysogaster* Geoffrey, 1804 (2n=48).

MATERIAL AND METHODS

All animals were live-trapped in south-east Tasmania. Details of number and sex are shown in the table. Skins and skulls of all specimens, with trapping data, are lodged in the Tasmanian Museum, Hobart, and their museum registration numbers are also shown in the table.

The animals were killed with trichloroethylene and tissues for examination removed immediately after death. The most successful preparations were those from bone marrow. The xiphysternum and about 1-1½ inches of the sternum were removed and placed in 5 cc of Ringer solution, to which 0.5 mg of demecolcine had been added. The tissue was minced in this and then allowed to stand at room temperature for an hour. After centrifuging, the deposit was resuspended in warm 0.075 M potassium chloride and the suspension maintained at 37° C for an hour. Fixation was by methanol and acetic acid in a 3:1 mixture and the preparations were stained in Giemsa.

Various adaptations of methods used for human tissues were used to culture blood, spleen and testicular tissues but none was uniformly successful.

RESULTS

The karyotypes are shown in figures 1-6. The karyotype of *Rattus lutreolus*, with forty-two chromosomes and an XX-XY sex chromosome mechanism, closely resembles that of *Rattus rattus*. It has been previously described from one specimen by Kennedy (1969).

The karyotype of *Hydromys chrysogaster* has forty-eight chromosomes and confirms that recently reported by Martin (1969). Unlike that author I do not feel able to divide the large group of acrocentrics or to distinguish sex chromosomes. Kennedy (1969) described an identical karyotype from one South Australian specimen of *H. chrysogaster*.

The karyotype of *Pseudomys higginsi* is indistinguishable from that of *H. chrysogaster*.

DISCUSSION

Matthey (1968) has recently commented on the particular interest of cytogenetic studies on Australian rodents because of their unusual evolutionary history. It is, therefore, interesting to note that the karyotype of *Rattus lutreolus* could be a basic one from which those of *Rattus assimilis*, thirty-eight chromosomes, and *Rattus conatus*, thirty-two chromosomes (Martin, 1969) may be derived by a series of Robertsonian translocations. Kennedy (1969) was able to suggest from her own work that the karyotypes of *R. assimilis*, *Rattus fascipes* and *Rattus greyii* could be derived from the *R. lutreolus* karyotype.

The karyotypes presented here would suggest that *Pseudomys* and *Hydromys* are closely related genera although they are morphologically very dissimilar and have been placed by Simpson (1961) in separate groups. The karyotype of *P. higginsi* differs from that described from one specimen of *Pseudomys minnie* by Kennedy (1969). *P. higginsi* has no submetacentrics whereas Kennedy describes *P. minnie* as having two pairs. Hence, using Matthey's concept of total metaphase arm number, there is a difference of eight arms between these species.

This difference and the possibility of creating a possible sequence for the evolution of the *Rattus* species based on translocations, suggest that some revision of the taxonomy of this group may be necessary when karyotypes of more species are known.

ACKNOWLEDGMENTS

I would like to thank the Kingston Beach Golf Club for permission to trap on its land, and the Tasmanian Museum, the Zoology Department of the University of Tasmania and Mrs J. Lasky for the loan of traps.

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TABLE

Species	*Sex*	*Chromosomes examined from*	*Tasmanian Museum Number*
Rattus lutreolus	Female	Blood and spleen	A849
Rattus lutreolus	Female	Bone marrow	A852
Rattus lutreolus	Female	Bone marrow	A850
Rattus lutreolus	Male	Bone marrow and spleen	A848
Rattus lutreolus	Male	Bone marrow	A851
Pseudomys higginsi	Female	Bone marrow	A846
Pseudomys higginsi	Female	Bone marrow	A847
Pseudomys higginsi	Male	Bone marrow	A845
Pseudomys higginsi	Male	Bone marrow and testis	A841
Hydromys chrysogaster	Female	Bone marrow	A843
Hydromys chrysogaster	Male	Bone marrow	A839
Hydromys chrysogaster	Female	Bone marrow	A858

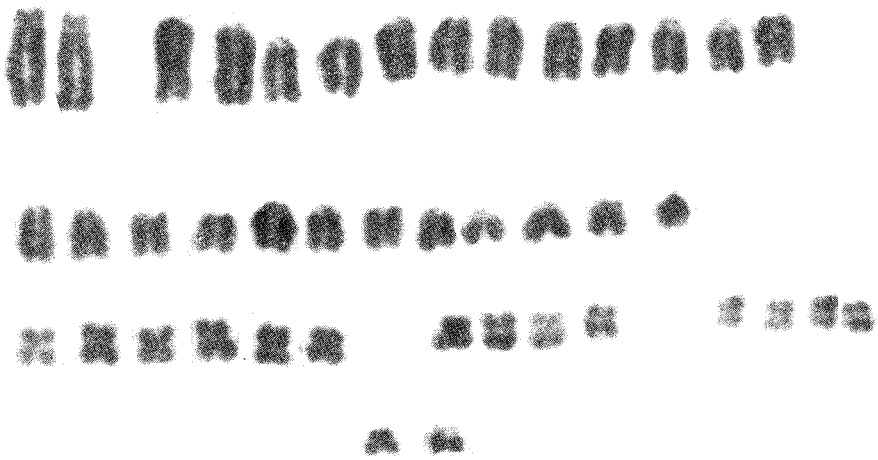

PLATE 1.—Karyotype of *Rattus lutreolus*, female. The sex chromosomes are included in the group of acrocentrics.

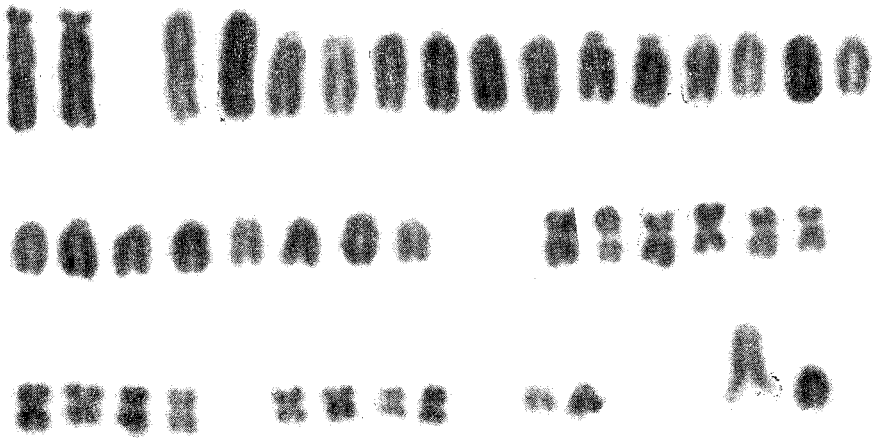

PLATE 2.—Karyotype of *Rattus lutreolus*, male. The probable sex chromosomes are at the lower right.

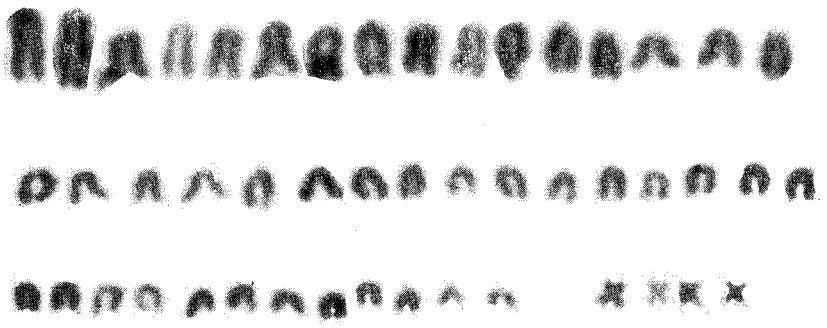

PLATE 3.—Karyotype of *Pseudomys higginsi*, female.

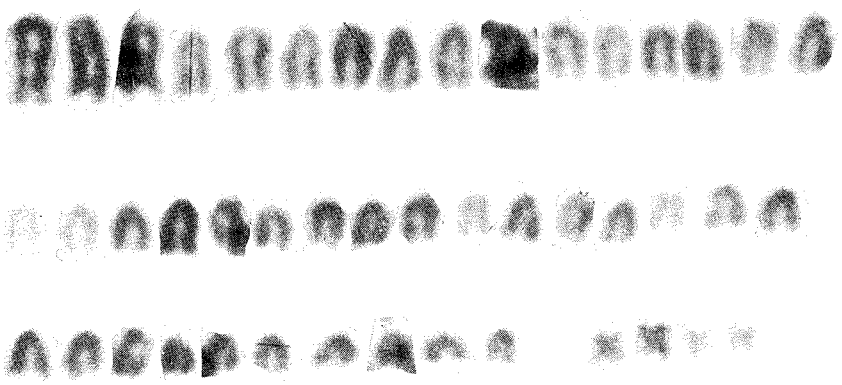

PLATE 4.—Karyotype of *Pseudomys higginsi*, male.

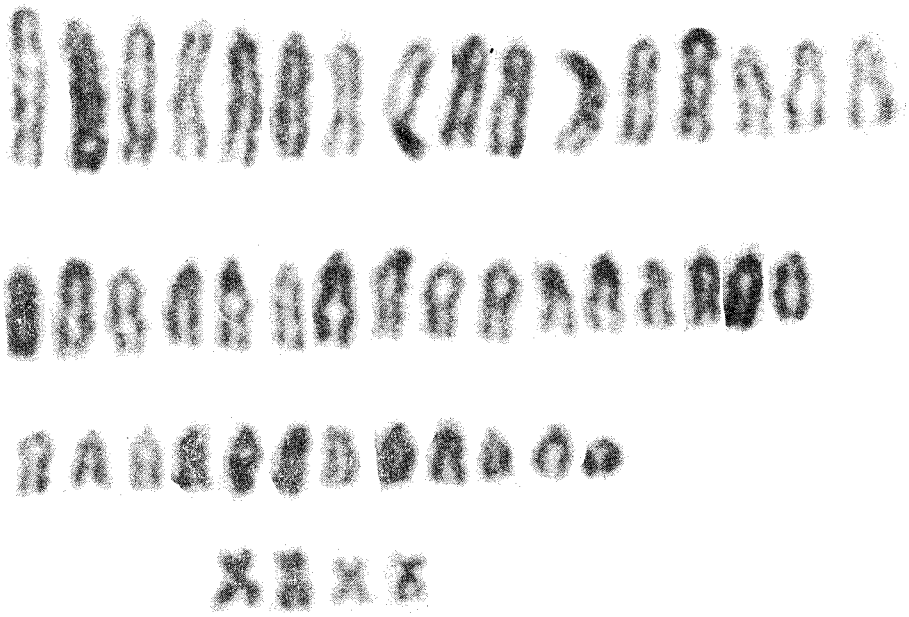

PLATE 5.—Karyotype of *Hydromys chrysogaster*, female.

PLATE 6.—Karotype of *Hydromys chrysogaster*, male.