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Caithness revisited: Robertsonian chromosome polymorphism in Caithness house mice

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The purpose of this communication is to revise and clarify the position regarding house mouse populations with Robertsonian chromosomes in the northern Scottish county of Caithness.

Several years ago Adolph and Klein (1981) described three Robertsonian translocations in nine mice caught near Castletown in the north of Caithness. All were homozygous for Rb(4.10) and Rb(9.12); eight were homozygous for Rb(6.13), the other was heterozygous for this fusion. Hence, eight of the mice had a diploid chromosome number of 34 ($2n = 34$), the other was $2n = 35$. Shortly afterwards Brooker (1982) confirmed this finding and reported also 12 other Robertsonian translocations in 31 Caithness house mice from 18 locations in the county.

In 1985, one of us (PNS) caught and karyotyped ten animals from three locations in Caithness (table 1). Somatic karyotype analyses were made from G-banded metaphse spreads of peripheral blood lymphocytes obtained by orbital sinus puncture and culture (adapted from the methods of Triman, Davisson and Roderick, 1975; and Buckland, Evans and Sumner, 1971). Only four Robertsonian translocations were found, those described by Adolph and Klein (1981), plus Rb(11.14) described in Brooker (1982).

Since no mouse has been found within Caithness with less than 32 chromosomes (indicative of only four centric fusions), it seemed necessary to re-examine the earlier material. Analysis of photographs and negatives (slides having deteriorated badly) led us to agree that only four Robertsonian translocations seem to be represented in Caithness: Rbs(4.10), (6.13), (9.12) and Rb(11.14) (Fig. 1). Table 1 shows those individuals where the karyotype was determined without equivocation. Although the sample sizes are small (one or two individuals in most cases), each centric fusion has a widespread distribution within Caithness. To date all Caithness house mice are homozygous for Rb(9.12) and Rb(4.10) (with one exception in 37 mice karyotyped), but some are segregating for Rb(6.13) and Rb(11.14).

To the north, three of the Orkney islands have house mice with centric fusions (Adolph and Klein, 1981; Brooker 1982; Nash, Brooker and Davis, 1983). All mice with Robertsonian chromosomes in this region share Rb(9.12) suggesting they have a common origin. Excluding Rb(6.13) (which is also found in the CD race of central Italy; Capanna, Civitelli and Cristaldi, 1977), no Scottish Robertsonian translocations have been reported elsewhere to our knowledge.

In summary, Caithness house mice have four Robertsonian translocations. They are homozygous for Rb(9.12) and Rb(4.10), and segregate for Rb(6.13) and Rb(11.14). These results do not adversely affect Caithness's relationship with other Robertsonian populations (see Larson, Prager and Wilson, 1984). However, Caithness mice are obviously less curious than previously thought.

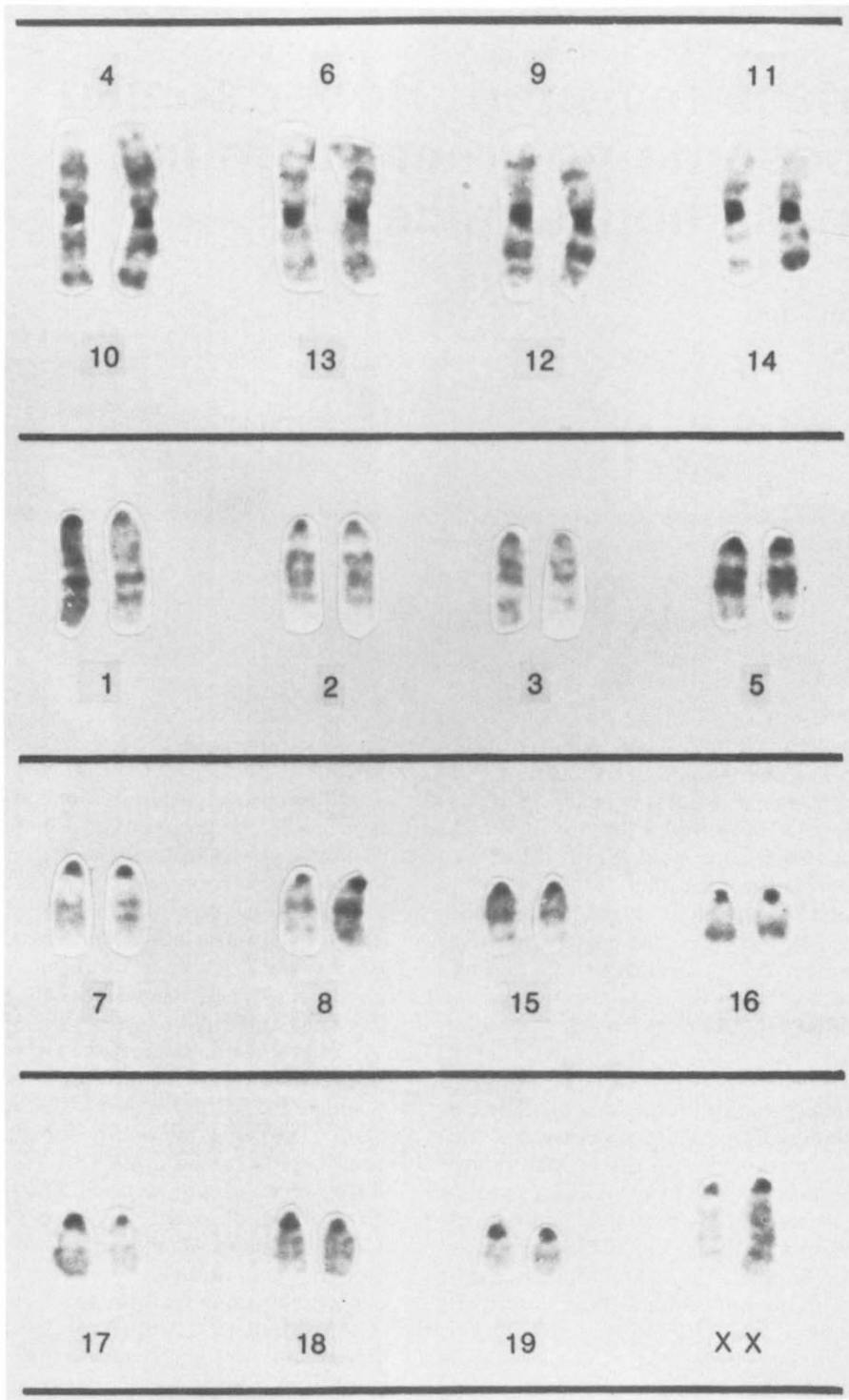

Figure 1 G-banded karyotype of the house mouse caught at location eight, $2n = 32$, N.F. = 40.

Table 1 Analysis of house mice caught in Caithness

Location	O.S. Grid Reference	No. of ♂	No. of ♀	2n	Centric fusion 4.10	6.13	9.12	11.14
Brooker (1982)								
(4) Dunnet, Castletown	215714		1	37	hom		het	
(6) Greenland	244676		1	34	hom	hom	hom	
(7) Lyth	278633	1		35	hom	het	hom	
(8) Sortat, Lyth	289632		1	32	hom	hom	hom	hom
(9) Auckengill	363643	1		32	hom	hom	hom	hom
(9) Auckengill	363643	1		33	hom	hom	hom	het
(9) Auckengill	363643		2	36	hom		hom	
(11) Bowermadden	241643	1		34	hom	het	hom	het
(12) Spittal, Halkirk	167545	1		36	hom		hom	
(13) Lower Strath-Watten	257550		1	32	hom	hom	hom	hom
(14) Westfield-Lewary	058643		1	35	hom	het	hom	
(15) Bardnaclavan	071647	1		35	hom		hom	het
(16) Brickigore, Thrumster	345447	1		32	hom	hom	hom	hom
(17) Smerlie, Lybster	322407	1	1	36	hom		hom	
(18) Lybster	243357	2		36	hom		hom	
Sutherland, Helmsdale	029166	1		40				
Sutherland, Melvich	882647	1	1	40				
Adolph and Klein (1981)								
Castletown	195679	—	—	34	hom	hom	hom	
Castletown	195679	—	—	35	hom	het	hom	
Scriven (1985, unpublished)								
Shalmstry	130646	1		32	hom	hom	hom	hom
John O'Groats	381725	2		32	hom	hom	hom	hom
John O'Groats	381725	2		33	hom	hom	hom	het
Middle Keiss	341615	1	1	32	hom	hom	hom	hom
Hawk Hill, Keiss	352625	1		32	hom	hom	hom	hom
Keiss	362623	1	1	32	hom	hom	hom	hom

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