SHORT COMMUNICATION

CHROMOSOMAL BANDING PATTERNS IN THREE SPECIES OF RATS¹⁾

MICHIKO MORI, MOTOMICHI SASAKI AND NOBUO TAKAGI

Chromosome Research Unit, Faculty of Science, Hokkaido University,
Sapporo 060

Received November 4, 1973

To investigate intrachromosomal variations among allied species we compared chromosomal banding patterns in 3 species of rats, *Rattus norvegicus* (1♂, WKA strain), *R. rattus* (1♂, captured in Sapporo) and *R. exulans* (1♀, 1♂, kindly supplied by Dr. T. H. Yosida, National Institute of Genetics, to whom we express our cordial thanks). Air-dried chromosome slides prepared from adult bone marrow cells and/or cultured fibroblasts were subjected to the banding pattern analysis following the Q- (Mori and Sasaki 1973), G- (Seabright 1972 or Summer *et al.* 1972), and C-staining (Summer 1972) methods.

The 3 species showed the same diploid number, 42. The Q- and G- band analyses revealed a general similarity of their karyotypes, with some exceptions as described in the following. Representative Q-band karyotypes were shown in Figure 1, which were compared according to the numbering system proposed by the committee for a standard karyotype of *R. norvegicus*, (1973). The karyotype of *R. exulans* was nearly identical to that of *R. norvegicus*, except for an excess bright band in the proximal region of the no. 1 long arm, the absence of satellites in no. 3 and the Y chromosome which was as large as no. 8 autosomes. Since the Y chromosome of this species has been reported to be a smaller element (Yong 1969; Yosida 1973), the unusually long Y in the present specimen might be an intraspecific variant. The karyotype of *R. rattus* displayed considerable deviations from that of *R. norvegicus* (Figs. 1 and 2), though the former species has been known to show several types of chromosomal polymorphism in natural populations (Yosida and Sagai 1972). Nos. 1, 12 and 13 autosomes of the present specimen were apparently acrocentric, while the corresponding pairs in *R. norvegicus* were subtelocentrics having different banding patterns. Nos. 14, 15 and 16 autosomes also exhibited different banding patterns between the two species. The differences in nos. 1, 13 and 15 could be explained by pericentric inversions, but those seen in the other elements were inexplicable by such a simple mechanism. The Y chromosome of *R. rattus* was very small, showing a distal faint band.

The G-band karyotypes of the 3 species were essentially similar to the Q-band ones, though the centromeric regions and satellites were more clearly demarcated in the former. Thus, we confirmed the G-band studies by Yosida and Sagai (1972, 1973), with more precise demonstration of interspecific variations in smaller chromosomes. The

1) Supported by Grants-in-aid for Scientific Research from the Ministry of Education.

Fig. 1. Q-band karyotypes of *Rattus norvegicus* (Rn), *R. exulans* (Re) and *R. rattus* (Rr) arranged in accordance with standard numbering system for *R. norvegicus*.

C-bands of *R. norvegicus* matched well with the results shown by Unakul and Hsu (1972), except that the Y chromosome stained deeply only at the distal end. Comparing

Fig. 2. Schematic illustration of chromosomes, showing different fluorescence patterns among *R. norvegicus* (n), *R. exulans* (e) and *R. rattus* (r).

to *R. norvegicus*, *R. rattus* possessed apparently larger and well-defined C-bands in most chromosomes except the Y and no. 5 chromosomes. Although we failed in demonstrating the C-bands of *R. exulans*, this species had relatively large and well-defined centromeric Q-bands in most of the acrocentrics (Fig. 1). Recently, Dev *et al.* (1973) reported that all chromosomes, other than the Y, of *Mus cervicolor* showed a brightly fluorescent centromeric region, in contrast to *Mus musculus* in which the corresponding regions did not show fluorescence. No other differences in the Q-band patterns were observed between the two species. This and the present data suggest that certain differences in the nature of centromeric heterochromatin may also play an important role in the evolutionary process of allied species.

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