

## SHORT PAPER

### *Nijmegen waltzer*—a new neurological mutant in the mouse

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In 1964 a mouse with abnormal behaviour was discovered in our non-inbred Swiss albino stock which we had obtained in 1958 from the Central Breeding Station, T.N.O., Utrecht, The Netherlands. This animal could not be propagated, but more mutants arose later. Subsequent breeding tests revealed that the character is due to a single autosomal recessive mutation. There is evidence that the gene belongs to linkage group I and the symbol *nv* is proposed for it.

Affected animals tend to run in tight circles in both directions. They show horizontal and vertical head shaking. Considering ear pinna responses, they are not deaf and retain their sense of hearing into old age. When held up by the tail, the mutants display normal placing reactions. They swim well, often in circles, and climbing a rod is done easily. Many male mutants are very aggressive indeed; they will inflict many wounds to the backs of their cage mates. The expressivity of the phenotype is variable. Circling may occur infrequently or not at all in mutants and sometimes the instability of the head is barely perceptible. In some cases two observers had to watch them for several minutes before being able to ascertain the head wobbling. Mutants may be best recognized at the age of about 4 weeks. The most suitable situation for observing them seemed to be their home cage.

Both sexes are fully fertile and litter size turned out to be normal. Although viability was not reduced (see below), mutants had significantly lower body weights than their wild-type litter-mates. We found in 84 subjects weighed between 5 and 6 weeks of age the following values for mean  $\pm$  s.d. (g): 25 mutant  $\text{♀♀}$ ,  $15.8 \pm 3.3$ ; 25 normal  $\text{♀♀}$ ,  $16.9 \pm 3.7$ ; 17 mutant  $\text{♂♂}$ ,  $18.1 \pm 4.5$ ; 17 normal  $\text{♂♂}$ ,  $18.8 \pm 4.6$ . Application of a non-parametric combining test (Van Eeden & Benard, 1957) gave a *P* of 0.3%.

Judging from the descriptions of the behavioural phenotypes of about 100 neuromuscular mutants mentioned in the catalogue by Sidman *et al.*, 1965, and in recent issues of *Mouse News Letter*, it appears that the present mutant, named *Nijmegen waltzer*, has not been previously reported.

As for the genetic findings, incrosses of mutants yielded exclusively deviants (234). Outcrosses of mutants to normal mice taken from two other stocks produced 254  $F_1$  offspring, all wild-type. After mating mutants to C57BL/6 mice, we bred an  $F_2$  which segregated in a proportion of 124 non-mutants and 47 mutants. This segregation shows good agreement with a 3:1 ratio. The sex ratios did not deviate significantly from expectation.

By mating  $F_1$  mice to the albino *Nijmegen waltzer* a double backcross was obtained, enabling us to test for linkage between *nv* and *c*. The segregation of the phenotypes was as follows: 67 ++, 41 *c*+, 47 +*nv*, 68 *cnv*; total 223. The sex ratios were according to expectation and the segregation of the *nv* locus (108:115) fits a 1:1 ratio excellently.

The above results are compatible with a single autosomal recessive allele that in homozygous condition does not reduce viability and is fully penetrant. Using Mather's (1951, p. 33) formulae we found  $\chi^2_c = 0.112$  (70%  $< P < 80\%$ ),  $\chi^2_{nv} = 0.220$  (50%  $< P < 70\%$ ),

$\chi^2$ Linkage=9.906 ( $P \ll 1\%$ ), and  $\chi^2$ Total=10.238 ( $1\% < P < 2\%$ ); hence, linkage between *nv* and *c* is indicated. Estimation of the recombination percentage and standard error according to Mather (1951, pp. 47–48) gives  $39.5 \pm 3.3\%$ . In order to confirm this linkage, tests are being carried out with *pink-eyed dilution* (*p*), which is also located in linkage group I (Green, 1966).

## SUMMARY

A new neurological mouse mutant, *Nijmegen waltzer* (symbol *nv*), that causes circling and head-shaking without deafness, a marked tendency for aggressiveness, and reduced weight, is described. It is a single autosomal recessive, with complete penetrance and variable expression, and is probably located in linkage group I.

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