

# Allozyme variation in *Rattus rattus* (Rodentia: Muridae) in Turkey, with particular emphasis on the taxonomy

by Nuri Yiğit, Ercüment Çolak, İrfan Kandemir, Tolga Kankılıç, Reyhan Çolak, Şafak Bulut, Pınar Çam, Fulya Saygılı, Mustafa Sözen and Şakir Özkurt

**Abstract.** The Turkish black rat "*Rattus rattus*" shows variation in coat colour corresponding to the occurrence of three subspecies with intermediate colour stages: *Rattus rattus rattus*, *Rattus r. alexandrinus* and *Rattus r. frugivorus*. Turkish black rat populations were divided geographically into six sub-populations: Rr1= Northwest Anatolia, Rr2= Central Anatolia, Rr3= Eastern Mediterranean, Rr4= Western Mediterranean, Rr5= Turkish Thrace, and Rr6= Black Sea region. Genetic variation was assessed using twenty two isoenzyme systems. Seven of twenty-two loci (*Pgm-1*, *Hk*, *Me-M*, *G3pdh*, *Gpdh-1*, *Gpi*, *Fum-1*) were found to be polymorphic. The mean value of  $F_{ST}$  is found to be 0.073, indicating 7.3 % genetic variation among groups and suggesting the existence of a moderate differentiation between sub-populations of the Turkish black rat. Overall mean heterozygosity ( $H_o$ = direct count) for sub-populations was  $H_o$ = 0.020, ranging from 0.008 to 0.031. Nei's measure of genetic distance showed that Rr2 and Rr6 were the most identical and sub-populations Rr1 and Rr5 had diverged the most.

**Key words.** Allozyme, morphology, *Rattus rattus*, Turkey, Middle East.

## Introduction

The genus *Rattus* is known to be a widely distributed and taxonomically mixed group that includes many species and subspecies throughout the world (WILSON & REEDER 1993). There are only a few distribution records of *R. rattus* Linnaeus, 1758 and *R. norvegicus* Berkenhout, 1769 in Turkey (AHARONI 1932, NEUHAUSER 1936, LEHMANN 1969, YIĞIT et al. 1998). Taxonomic studies performed on this genus in eastern and south-eastern Asia and Europe have mainly focused on karyology.

The black rat has been the subject of numerous cytogenetic studies (CAPANNA et al. 1970, CAPANNA & CIVITELLI 1971, YOSIDA 1973, 1980, YOSIDA et al. 1971, YIĞIT et al. 1998, KANKILIÇ et al. 2006). These studies have revealed a great wealth of chromosomal diversity within the species, including pericentric inversions, centric fusions, centric fissions, C-band polymorphisms and supernumerary chromosomes. YIĞIT et al. (1998) described the karyotypes of the Turkish populations of *R. rattus* and *R. norvegicus* along with colour variations. According to YIĞIT et al. (1998) there are four common colour morphs in the Turkish black rat, with intermediate colour stages.

The patterns of the blood serum proteins of the genus *Rattus* in Turkey were compared with SDS-PAGE (YIĞIT et al. 2001), but did not show the diagnostic characteristics related to *R. rattus*. Although extensively studied from a karyological point of view, few estimates of genetic variability in black rats are available. Overall levels of intrapopulation allozyme polymorphism are relatively low, ranging from 0.0 % to 10.2 % in mainland populations (BAVERSTOCK et al. 1983, GEMMEKE & NIETHAMMER 1984, PATTON et al. 1975), but values