

**BIOCHEMICAL GENETIC TYPING OF A SOUTHERN AFRICAN ENDEMIC
DOMESTIC DOG BREED FROM RURAL AREAS**

by

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ABSTRACT

Electrophoresis (horizontal starch gel and PAGE) was used to study the genetic diversity and uniqueness of an endemic southern African domestic dog (Africanis) breed. The results were compared to those of three other populations/breeds: blood samples obtained from the Society for the Prevention of Cruelty to Animals (SPCA); indigenous Middle Eastern dog breed (the Saluqi) and hybrid (mongrel) dogs from the Jericho-area, near Brits (South Africa). Gene and phenotypic allele frequency and genetic differentiation were analysed at 21 protein coding loci. Nine polymorphic loci were identified (**AK-1, -2, CK, PER, Hb, PA-1 to -3 and P-Tf**). The average heterozygosity ranged from 0.106 to 0.159; the percentage of polymorphic loci were the least in the Saluqi (23.81%) and ranged to 33.33% in the Jericho breed; and the mean number of alleles per locus varied from 1.33 (Saluqi) to 1.43 (Jericho). Significant deviations ($P < 0.05$) of allele frequencies from expected Hardy-Weinberg proportions occurred in loci **AK-1, -2, Hb** and **P-Tf**. These loci can serve as markers to define groups (i.e. only Africanis showed the presence of private alleles, **CK*B** and **PA-2*C**). The genetic distance values (D_{78}) were between 0.001 and 0.026, with the smallest distance between Africanis and Saluqi, and the largest distance between Jericho and Africanis. This former, small **D**-value indicates a close genetic relationship between Africanis and Saluqi, supporting archaeological evidence that the endemic Africanis breed has indeed been introduced from the Middle East thousands of years ago, and not through western influences. These results are discussed with specific reference to genetic variation and differentiation that makes the endemic southern African domestic dog breed unique.

OPSOMMING

Elektroforese (horisontale styseljel en PAGE) is gebruik om die genetiese diversiteit en kenmerkende eienskappe van 'n endemiese suidelike Afrikaanse gedomestiseerde hondras (Africanis) te bestudeer. Die resultate is vergelyk met die van drie ander populasies/rasse: bloed monsters is verkry van die Dierbeskermingsvereniging (DBV); inheemse Midde-Oosterse honde (die Saluki's) en hidriede (baster) honde van die Jericho-area naby Brits (Suid-Afrika). Geen- en fenotiep aleelfrekwensies en genetiese differensiasie is geanaliseer by 21 proteienkoderende lokusse. Nege polimorfiese lokusse is geïdentifiseer (**AK-1, -2, CK, PER, Hb, PA-1 tot -3 en P-Tf**). Die gemiddelde heterosigositeit strek van 0.106 tot 0.159; die persentasie polimorfiese lokusse is die kleinste in die Saluki ras (23.81%), met 'n maksimum van 33.33% in die Jericho groep; die gemiddelde aantal alele per lokus wissel van 1.33 (Saluki) tot 1.43 (Jericho). Betekenisvolle afwykings ($P < 0.05$) van verwagte Hardy-Weinberg verhoudings in aleelfrekwensies kom voor by lokusse **AK-1, -2, Hb** en **P-Tf**. Dié lokusse kan dien as merkers om groepe te definieer (bv. die teenwoordigheid van skaars- of privaat-alele **CK*B** en **PA-2*C** is slegs in Africanis teenwoordig). Die genetiese afstand waardes (**D₇₈**) is tussen 0.001 en 0.026, met die kleinste afstand tussen Africanis en Saluki, en die grootste afstand tussen Jericho en Africanis. Die eersgenoemde, klein **D**-waarde dui op 'n sterk genetiese verwantskap tussen Africanis en die Saluki's, wat argeologiese bewyse ondersteun dat dié endemiese ras duisende jare gelede al vanaf die Midde-Ooste af migreer het en so bekend gestel is (en nie deur westerse invloede die Afrika kontinent bereik het nie). Hierdie resultate is bespreek met spesifieke verwysing na die genetiese differensiasie en variasie wat hierdie endemiese, suidelike Afrikaanse hondras uniek maak.

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