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A STUDY OF MOUSE  
BLOOD PROTEINS IN THE INBRED STRAINS  
101/TaMac, NZB/B1 AND NZY/B1.

A thesis presented in partial fulfilment of the  
requirements for the degree of Doctor of Philosophy  
at Massey University

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1970



101

NZB

NZY

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## ABBREVIATIONS AND SYMBOLS

A/S	antiserum
BOG	bovine $\gamma$ -globulin
BSA	bovine serum albumin
DE (D.E.)	disc electrophoresis (page 35)
df (d.f., D.F.)	degrees of freedom
F	variance ratio
GF (G.F.)	gel filtration (page 34)
GFA, GFG, GFM	gel filtration fractions (pages 3 and 112)
IE (I.E.)	immuno-electrophoresis (page 37)
MS (M.S.)	mean square
MW	molecular weight
m $\mu$	millimicron (light wavelength)
OD (O.D.)	optical density
p	probability of obtaining the same or a greater F or t due to chance in the absence of an effect
PAS	periodic acid Schiff
PCV	packed cell volume (%)
P.N.M.R.F.	Palmerston North Medical Research Foundation
ppd	<u>para</u> -phenylenediamine
S.A.R.U.	Massey University Small Animal Research Unit
SD	standard deviation (estimate of $\sigma$ )
t	Student's t
$\mu$	ionic strength
$\mu$ g, $\mu$ l	microgramme, microlitre
$\sigma^2$	variance

ABSTRACT

The serum protein patterns of mice of the inbred strains 101/Fa<sup>1</sup>ac, NZB/B1 and NZY/b1 were compared by gel filtration chromatography and disc electrophoresis in polyacrylamide gel. The gel filtration and disc-electrophoretic patterns were correlated with each other and with the immunoelectrophoretic pattern. Components of the disc-electrophoretic pattern conclusively identified were albumin, immunoglobulin IgG, haemoglobin, the sex-dependent prealbumin, three components of transferrin, ceruloplasmin,  $\alpha$ -macroglycoprotein and the sex-dependent  $\alpha$ -globulin. Immunoglobulin IgM and haptoglobin were identified less conclusively. Estimates of the molecular weights of most components of the disc-electrophoretic pattern were made by gel filtration.

Quantitative comparisons were made for each gel filtration fraction and disc-electrophoretic component measured, according to linear models incorporating parameters due to sex, strain, age and interaction effects. NZB mice were found to have higher levels of immunoglobulins than 101 and NZY mice after the age of three to four months. The apparently high activity of the immune system of NZB mice is discussed briefly in relation to autoimmunity.

Sex effects on the levels of several components were observed and were particularly marked for an  $\alpha$ -globulin, for one of the transferrin components resolved by disc electrophor-

esis and for prealbumin. All three were about 1.5 times higher in males than in females. Strain-within-sex effects for the latter three components were indicated by lower levels in NZB males than in 101 and NZY males.

Over all strains, while one transferrin component was higher in males than in females, the most prominent transferrin component was at slightly lower levels in males than in females. The possibility that the different transferrin components have different functions is discussed briefly.

Sex differences were observed in the residual variances, after fitting sex, strain and age effects, of 17 out of 19 disc-electrophoretic components; the variances for males were higher than for females for all 17 components.

Differences in the levels of several components were observed between samples taken from the same mice a week apart. The between-week variations in albumin and transferrin were opposite to the between-week variations in most of the other components.

The three inbred strains were typed for transferrin and haemoglobin phenotypes. All three strains had the slower, TrfB, transferrin; 101 and NZB mice had diffuse, D, type haemoglobin and NZY mice had single, S, type haemoglobin.