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STUDIES IN NEURO-ENDOCRINOLOGY:

STUDY 1:

THE EFFECT OF PRE-PUBERTAL GONADECTOMY
ON THE GROWTH RATE OF CATS.

STUDY 2:

A COMPARATIVE STUDY OF SELECTED ASPECTS
OF THE POSSUM (TRICHOSURUS VULPECULA
KERR) BRAIN.

A thesis presented in partial fulfilment of the requirements for the degree
of Master of Science in Physiology at Massey University.

Anthony Kettle
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ABSTRACT

Gonadectomy is the commonest surgical procedure carried out in the cat, mainly for fertility control. However, the effect of gonadectomy on body weight in the cat has received little study although this subject is well researched in other species, such as the rat. Part I of the present study involved gonadectomy at 20 weeks. The cats were housed in outdoor colony cages and given food ad libidum, adjusted to leave daily residues. Body weight was measured weekly and transformed to \log_{10} . For statistical analysis, differences in body weight of each cat were tested by one-way analysis of variance and serial covariance using the previous week's body weight as the covariate. Differences between groups were investigated with 't' tests and growth rates were studied by regression. Up to 32 weeks of age there was no statistically significant difference between the growth rates of entire versus the castrates in either sex. However, when extended to 55 weeks of age prepubertal gonadectomy in the female cat caused significantly increased growth. This was not observed for the male cat.

Little information is available on the anatomy of the brain of the Australasian possum (Trichosurus vulpecula). Part II of the present study aims at presenting a simple description of the possum hypothalamus viewed in three planes of section and concentrating on some of the fibre tracts which are clearly visible. The main findings were that the mammillothalamic tract appears in a similar position to that as seen in other mammals such as the rat, cat, and sheep, while the fornix appears much steeper in its descent into the anterior hypothalamus. In addition, there is described a fibre tract emanating from the optic chiasma and passing to the caudal part of the paraventricular nucleus. This tract has not been described in other mammals, such as the rat, cat, and sheep.

PREFACE

In 1977 Ms E Sommerville and Dr M Tarttelin of Massey University conducted a preliminary study on the effect of pre-pubertal gonadectomy on the growth rate of cats. The results of this preliminary study were viewed with caution due to a suspected nutritional inadequacy in the diet. The present study was therefore undertaken using an experimental canned cat diet produced by J Wattie Canneries Ltd., which had an increased protein level. The results of this study were compared to the former investigation.

Part II of this thesis arose from a personal interest in the New Zealand possum (Trichosurus vulpecula) and was carried out during the later part of the year when the daily work involvement for the cat growth study was reduced.

The two studies are quite unrelated except in so far as it was hoped to be able to identify a definitive ventro-medial hypothalamus (VMH) in the hypothalamus of the possum. The VMH region in cats has been implicated in the control of growth, thus providing a tentative link between the two studies.

The title 'possum' for the New Zealand species of Trichosurus vulpecula and 'opposum' for the American, Didelphis virginiana was adopted in line with a growing convention amongst investigators in the field, although there is still considerable controversy over the use of these titles as commented on in a recent edition of Possum Post (Possum Post No. 2:2 December 1980).

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Anthony Kettle
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