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DIET AND COEXISTENCE OF *RATTUS RATTUS RATTUS* (LINNAEUS),
RATTUS EXULANS (PEALE) AND *RATTUS NORVEGICUS*
(BERKENHOUT) ON STEWART ISLAND,
NEW ZEALAND

A thesis presented in partial fulfilment
of the requirements for the degree of

MASTER OF SCIENCE

in

ZOOLOGY

at

MASSEY UNIVERSITY

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1988

Abstract

Coexistence and diet of *Rattus rattus rattus*, *Rattus exulans* and *Rattus norvegicus* on Stewart Island was investigated by snap-trapping and stomach analysis. The trapping period was from June 1982 to December 1986. Four habitats were trapped for three nights every three months. Morphometric and reproductive information was collected throughout the programme. Studies of food availability, involving two forms of invertebrate sampling and plant phenology recordings, were undertaken in the final year of trapping.

Overall rat abundance was 4.0 rats/100 trap-nights which is comparable with other findings in mainland forests and on large offshore islands in New Zealand. *R. norvegicus* abundance was significantly lower than that of *R. rattus* and *R. exulans*. Species composition varied considerably between transects and a high degree of disassociation between *R. exulans* and *R. norvegicus* was recorded. *R. norvegicus* was restricted to areas very close to water. Seasonal variation in rat abundance was marked and was most affected by changes in *R. rattus* and *R. exulans* numbers. Highest rat abundance was in winter of each year.

Male *R. exulans* were heavier ($\bar{x} = 65.61$) than females ($\bar{x} = 60.77$) and the same was true for *R. norvegicus* (male $\bar{x} = 201.40$, female $\bar{x} = 165.50$). All rat species were smaller than those trapped previously from New Zealand. Few pregnant rats were trapped but seasonal breeding of *R. rattus* and *R. exulans* was suggested by annual increases in the proportions of juveniles in winter and spring.

Invertebrates and vegetation were the main foods eaten. In terms of frequency of occurrence and mean percentage volume, invertebrates were most important for *R. exulans* and *R. norvegicus*. For *R. rattus* invertebrates were also the most commonly eaten food but vegetation provided greatest volume of diet. Of the three species, *R. rattus* had a more varied diet and *R. exulans* was most reliant on invertebrates. Orthoptera, Opiliones, Chilopoda and Coleoptera were the invertebrates most frequently eaten by *R. rattus*, whereas Orthoptera, Araneida, Chilopoda and Terricolae were the most common in the diet of *R. exulans*. Decapoda (freshwater crayfish) were the most frequent diet item of *R. norvegicus*, and Opiliones, Othoptera, and Araneida were also common. Fruits, especially *Prumnopitys ferruginea*, and unidentified seeds and rhizomes were the more common plant foods eaten. A greater importance of leaf material than has been previously recorded is suggested in the diet of *R. rattus*. Birds were rarely eaten by *R. rattus* and *R. norvegicus* and not at all by *R. exulans*. Two instances of *R. norvegicus* having eaten lizards were recorded.

Diet overlap was considerable but significant species differences were found. Diet varied with season for each species and for *R. rattus* and *R. norvegicus* there was variation between transects.

Coexistence in the various habitats is discussed.

Acknowledgements

The production of this thesis would not have been possible without assistance and advice from a number of people. The New Zealand Wildlife Service (now incorporated into the Department of Conservation) allowed me to take over their rat trapping programme on Stewart Island. They provided much information as well as the rat stomachs they had collected from their trapping between June 1982 and February 1985. They also provided financial and logistical support for travel and field work for which I am grateful.

I would like to thank my supervisor Dr. John Skipworth whose comments and suggestions were always well received. Special thanks are due to Dr. Ian Henderson for his assistance and advice on the statistical analyses needed to interpret the data.

Dr. Phil Moors and Duncan Cunningham (Department of Conservation), who headed the Wildlife Service trapping study, provided helpful information and advice on rodent ecology. Duncan Cunningham also proof read and commented on the final draft for which I am most grateful.

Andy Grant (Department of Conservation) provided assistance with techniques needed for cuticle analysis. The use of the reference collection of plant cuticles that he produced was extremely helpful. I would also like to thank Dr. Ralph Powlesland (Department of Conservation) for his encouragement and advice throughout the project.

Comments and discussions with staff and senior students of the Botany and Zoology Department were often helpful. A special thanks goes to Ian McGee who accompanied me on the June 1986 trip.

Finally I would like to thank my family and friends for their support and interest shown throughout the study.

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