

STUDIES EXPLORING THE OVERWINTERING MECHANISMS OF  
THE CAT FLEA, *CTENOCEPHALIDES FELIS* (BOUCHÉ)  
(SIPHONAPTERA: PULICIDAE)

MARCO E. METZGER AND MICHAEL K. RUST

Department of Entomology, University of California, Riverside, California 92521 USA

The cat flea, *Ctenocephalides felis* (Bouché), is a seasonal ectoparasite of domestic and feral mammals worldwide. Adult fleas are generally most abundant during the warm spring and summer months, becoming scarce or absent during the cold winter months. However, reinfestations of unknown origin are common in spring and summer. The overwintering mechanisms of cat flea populations, especially in northern latitudes, has remained a mystery.

Pre-emerged adults can survive for extended periods of time inside the cocoon before emerging, making this an ideal overwintering stage. Previous studies showed that temperature had the greatest effect on adult emergence, whereas simulated seasonal photoperiods provided negligible effects. A relationship between cocoon strength and delayed adult emergence may exist. Differences in cocoon construction could provide barriers to emergence and thus maintain adult quiescence within the cocoon. The objective of this study was to determine if the amount of larval silk incorporated into the construction of the cocoon was correlated with delayed emergence of adults.

A novel method for measuring silk in cocoons was developed. Fleas were reared from egg to adult in sealed chambers maintaining 75% RH at three different temperatures, 26.7, 21.1, and 15.5 °C. Groups of mature third instars were collected at each temperature and placed in petri dishes containing either silica sand or granulated sugar and allowed to spin cocoons. Cocoons were sifted from the media and placed individually in wells of 96-well ELISA plates. Plates were checked daily for adult emergence and the dates recorded. After all had emerged, adults were dried in a 2% RH chamber and weighed. Cocoons spun in granulated sugar were dissolved in distilled water to isolate the silk, the silk dried in a 2% RH chamber, and weighed. Preliminary results showed that adult emergence was similar for sand and sugar cocoons at all temperatures. The average dry weight of the silk produced by individual larvae did not differ significantly between sexes or between temperatures. Possible relationships between the amount of silk produced by each larva and the time the pre-emerged adult remained within the cocoon will be discussed.