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PREVIEW

INCREMENTAL TAIL LOSS AND RUNNING SPEED OF
CNEMIDOPHORUS INORNATUS
(REPTILIA: TEIIDAE)

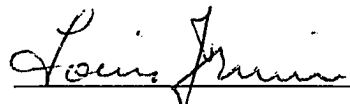
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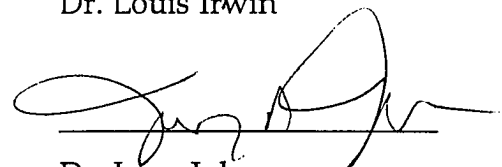
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PREVIEW

INCREMENTAL TAIL LOSS AND RUNNING SPEED OF

CNEMIDOPHORUS INORNATUS

(REPTILIA: TEIIDAE)

By

DEBORAH JANE GORDON, B.S.

THESIS

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Department of Biological Sciences
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I suppose if one has never attempted capture of whiptail lizards, it may be easy to misconstrue the physically and emotionally challenging process. I would like to set the record straight and thankfully acknowledge the many dedicated, hard-working people who would get up so very early to drive

(listening to Dr. Lieb's favorite talk radio station) into the 100° scorching desert. John Gardea contributed much of his normally relaxing summer time to catching lizards as well as listening to my unbounded thoughts on topics ranging from herpetology to gourmet cooking to life in New England. His love and support kept me strong throughout my time in El Paso and I will be forever grateful for all he has done for me. Nancy Watkins, who becomes almost paralyzed by the sight of snakes, also donated her time to bravely wander through rattlesnake country in search of whiptails. Her decision to move from New England to El Paso was the primary reason I was able to drive out of the driveway on that difficult day in January two years ago. Although Nance had long since left El Paso, her phone calls, so full of laughter and warm memories, helped me stay motivated and focused on my ultimate goal; she will forever remain a true best friend. Additional lizard "hunters" deserving of my gratitude are: Christine Carranza, the P.E.T.E. participants at Indio Ranch, Margarita Burnell, Dominic Lannutti, Mike Ross and Robin Kasson, Eric Lieb, Dr. Bill MacKay and his family, Hector Navaro, Tom Leonard, and William Baugh.

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ABSTRACT

Cnemidophorus inornatus exhibited a 33.5% decrease in running speed following 80% tail autotomy. The 20, 40, 60% tail loss lizards displayed mean speed changes of 1.4, -13.2, 14.6% respectively. Regression analysis indicated no correlation between percent tail loss and change in running speed for male lizards. However, there was a significant correlation between change in running speed and percent tail loss for females suggesting a gender behavioral difference that may be explained by a number of factors. Seasonal exposure time is greater in male whiptails; they initially appear before females and are significantly more active on a daily basis. Females would tend to remain in burrows longer when they are gravid and do not appear as early in the season. Exposure time may influence the primary anti-predator escape behaviors used by Cnemidophorus; males may in fact have evolved a more effective use of and, therefore, reliance on tail autotomy. Females tend to use faster speeds to escape predators because the loss of a tail would result in metabolic energy normally used in egg production and growth to be shuttled into tail regeneration. It was concluded from this investigation that male Cnemidophorus inornatus are able to lose up to 80% of their tails while still retaining effective anti-predator and running speed capabilities. Females exhibited progressively slower speeds with incremental tail loss suggesting selection for tail retention possibly for conservation of reproductive energy.

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INTRODUCTION

Lizard tail loss has been studied extensively with respect to compromised reproductive success, metabolic stress, loss of stored energy, regeneration rates, the structural process of autotomy, and tail break frequency. The tendency has been to investigate the effects of tail autotomy occurring near the base of the tail, in other words, almost complete loss of the tail. However, since attempted predation events do not always involve breakage of a seized tail only at its base, it would be important to ascertain the effects of partial tail loss on flight speed and behavior. Moreover, such effects would be especially significant in those lizards that use relatively high running speed as their primary method of predator escape. The purpose of this study was to quantitatively investigate the effects of incremental tail loss on maximum running speed and escape behaviors of Cnemidophorus inornatus.

Whiptail lizards of the genus Cnemidophorus are diurnally active, consume a variety of arthropods as food items and use a wide-foraging, opportunistic method of acquiring these prey (Scudday and Dixon, 1973; Vitt et al., 1977; Price, 1992; Anderson, 1993; Cuellar, 1993; Etheridge and Wit, 1993; Vitt and Breitenbach, 1993). Whiptails do not tend to exhibit territorial behaviors and generally have large home ranges (Etheridge and Wit, 1993; Garland, 1993; White and Anderson, 1994). Anderson (1993) reported that wide-foraging lizards may travel up to a kilometer or more per day and thus have