ISSN 0067-9208

NAVORSINGE VAN DIE NASIONALE MUSEUM

BLOEMFONTEIN

NATURAL SCIENCES

VOLUME 6, PART 7

OCTOBER 1989

TAIL-BREAK FREQUENCY, TAIL SIZE AND THE EXTENT OF CAUDAL AUTOTOMY IN THE CAPE THICK-TOED GECKO, *PACHYDACTYLUS CAPENSIS CAPENSIS* (SAURIA: GEKKONIDAE)

by

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(With 8 figures)

ABSTRACT

Bates, M.F. 1989. Tail-break frequency, tail size and the extent of caudal autotomy in the Cape thick-toed gecko, *Pachydactylus capensis capensis* **(Sauria: Gekkonidae). Navors. nas. Mus., Bloemfontein 6(7): 223-242.** The tails of geckos in three samples from widely separated areas in southern Africa (*viz.* Botswana/northern Transvaal, Pretoria and Orange Free State) were examined to determine tail-break frequencies, tail size and the extent of caudal autotomy. Tail-break frequencies in all samples were relatively high (51,5%, 52,9% and 68,8% respectively) when compared to most other African gekkonids and suggest the effectiveness of caudal autotomy for predator escape. There were no broken tails in the smaller specimens of each sample, after which tail-break frequency increased with increasing snout-vent length. The percentage of tail autotomized tends to increase with increasing SVL, suggesting a high occurrence of multiple tail breaks. There was no significant difference in tail-break frequencies between geckos from two microhabitat types in the Orange Free State. Growth in length of the original tail relative to SVL was symmetric, whereas growth in width of the original tail relative to SVL suggested a partial trend towards allometric growth. In a sample of geckos from the O.F.S., 64,1% of all specimens with regenerated or regenerating tails had autotomized over 80% of the tail length, suggesting that caudal autotomy commonly results in the loss of a large proportion of the tail in nature. Economy of autotomy can occur, but may be less effective for predator escape. (*Pachydactylus capensis capensis*; **Tail: break, size, extent**).

ISBN 0 947014 41 1

MATERIAL AND METHODS

Specimens examined

A sample of 247 alcohol preserved (70% ethanol) specimens in the wet collection of the National Museum, Bloemfontein, collected from throughout the Orange Free State, was examined. The majority were collected from 1972 to 1974 during De Waal's (1978) survey of the reptiles of the O.F.S. The site of capture was recorded for 212 of these specimens, with 67,9% (144) collected from among rocks and 32,1% (68) from disused termitaria. A second sample of 70 specimens (11 voucher specimens in National Museum, Bloemfontein: NMB R5780-5790) collected on the farm Goldstein near Pretoria, Transvaal, South Africa (2528Cd1) was examined. These geckos were collected from October 1985 to April 1986 and kept in captivity for observation until being released in May 1986. Of these, 91,4% (64) were collected from disused termitaria and 8,6% (6) from under rocks. Tail-break frequencies in a third sample of 97 specimens from Botswana and northern Transvaal were provided by Dr. D.G. Broadley of the Natural History Museum of Zimbabwe. These geckos were collected mainly in Kalahari sand areas. The majority were found under blocks of calcrete around the margins of pans, whereas some were taken in disused termitaria.

Femoral and pre-anal pores are absent in both sexes of *P.c. capensis* and the hemipeneal bulge of male geckos is not considered a reliable diagnostic character in preserved specimens. However, tail-break frequencies were determined for 63 males (identified by their everted hemipenes) and 12 ovigerous females (identified by the eggs which are visible through the transluscent ventral skin) from the Orange Free State.

Identification of regenerated tails

Regenerated tails are often distinguished on the basis of size, colour and scalation (Lee 1975). Although Zweifel & Lowe (1966) were not always able to distinguish regenerated tails in *Xantusia vigilis* (Family: Xantusidae) without the aid of radiographs, Lee (1975) found regeneration invariably associated with size, colour or scalation after confirmation using radiography on 15 specimens of *X. h. henshawi*. Werner (1968) distinguished regenerated tails in four species of Israeli geckos by their different colour and scalation, but used radiography on specimens with apparently original tails.

The original tail of a lizard contains a series of caudal vertebrae, whereas a regenerated tail contains only a cartilaginous rod (Etheridge 1967; Werner 1968; Arnold 1984; 1988). To test whether or not tails of *P.c. capensis* could be identified as either original or regenerated without the use of radiographs, five apparently original and six apparently regenerated tails (of specimens stored in 70% ethanol) were X-rayed (Figure 2). Radiographs confirmed the initial identification of tails as being either original or regenerated.

FitzSimons (1943) describes the regenerated tail of *P.c. capensis* as usually more strongly depressed and swollen laterally, covered with smooth, subequal, imbricate scales above and below. Regenerated tails are non-segmented and lack the rows of prominent tubercles present on original tails. They also show a slight difference in colour from the original and are usually shorter in length (Figure 3). Regenerating tails are immediately recognized by their small size and immature scalation. Specimens from the Orange Free State with apparently original tails were examined under a stereo-microscope at 10 or 16 times magnification to detect regenerated tail tips. As radiography was not used, some autotomy may have gone undetected, and tail break frequencies in all samples must be considered minimal estimates. Specimens with broken tails showing no signs of regeneration were not included in the analysis, as it could not be determined whether such tails were broken by predators or by collectors. Tails of preserved specimens may also break off during storage or when handled.

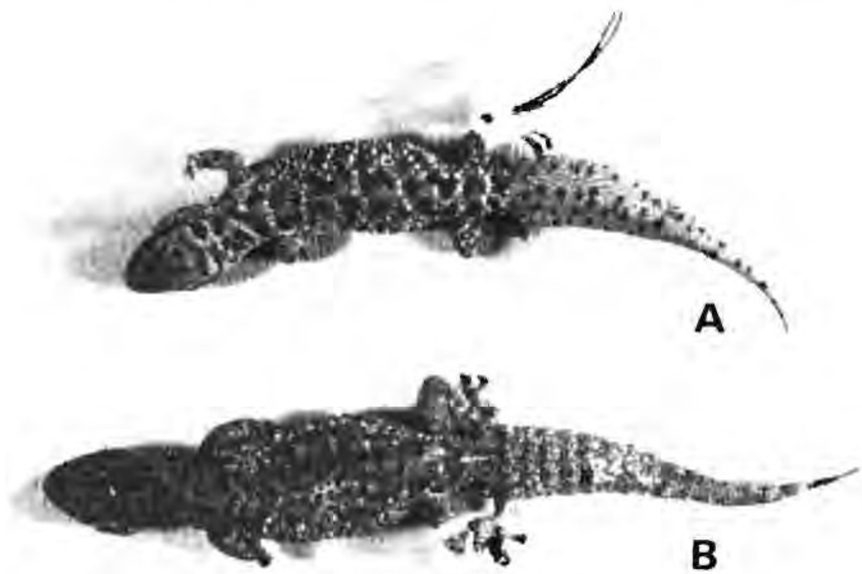

Figure 2: External appearance of regenerated (A) and original tail (B) of *Pachydactylus c. capensis*.

ERRATUM

Figure numbers for Figs 2 and 3 are transposed.

A B

Figure 3: Radiograph showing the skeletal structure of a regenerated tail (A) with cartilaginous rod and an original tail (B) with a continuous series of caudal vertebrae. The arrows indicate the position at which the tail was fractured.

Measurements

The tails of 247 alcohol preserved *P.c. capensis* (77 original, 170 regenerate[1]) collected from throughout the Orange Free State were examined. Snout-vent length (SVL), tail length, length of original tail remaining in regenerate-tailed[2] geckos and maximum tail width (at the base) were measured with vernier calipers to the nearest 0,02mm. Tail length to SVL and tail width to SVL ratios of original tails were calculated for all specimens.

The SVL and original tail length of 30 live geckos from the Pretoria area were measured to the nearest millimeter by carefully straightening specimens against the back of a transparent millimeter rule. Tail length to SVL ratios of original tails were calculated for all specimens.

Method used to determine the extent of caudal autotomy

In most species of gecko the tail is autotomous intravertebrally throughout its length distal to the pygal vertebrae, and breakage often takes place just in front of the place where the

1 Regenerate = regenerated and regenerating tails
2 Regenerate-tailed = regenerated and regenerating tails

tail is grasped (Arnold 1984; 1988). Such economy of autotomy minimizes the cost of tail regeneration and limits the loss of caudal fat reserves.

The incidence of economy of autotomy in a sample of 170 regenerate-tailed *P. c. capensis* collected from throughout the Orange Free State was investigated. To determine the extent of caudal autotomy, the percentage of original tail autotomized was calculated for all specimens. Probable original tail length of a specimen was determined by calculating the mean tail length to SVL ratio for lizards with original tails (30-59mm SVL; mean tail/SVL = 1,067; S.D. = 8,61mm; N = 71) (Figure 6b) and multiplying this value by the SVL of the specimen (Vitt, Congdon & Dickson 1977; Vitt 1983). The remaining length of original tail was measured and subtracted from the probable original tail length in order to predict the length of original tail autotomized. This was expressed as a percentage of the probable original tail length. Percentages were grouped into three size-classes (30-39mm, 40-49mm and 50-59mm SVL), with the number within each class being expressed as a percentage of the total number of regenerate-tailed geckos examined in the class (Figure 8).

The method used in this study differs from that of Daniels (1985), who used only the "mature regenerated tails" of the gecko *Phyllodactylus marmoratus* in his analysis. The original and regenerated portions of such tails were measured and the regenerated length expressed as a percentage of "mature regenerated tail" length. The regenerated portion of the tail was regarded as the length of tail autotomized. Regenerated tails were defined as mature if caudal scalation was complete. This method was not used as it was difficult to determine objectively when caudal scalation was complete in *P.c. capensis*. In addition, regenerated tails do not always reach their original length (FitzSimons 1943; Daniels 1983; Arnold 1984).

The method used in the present study is applicable to both regenerated and regenerating tails, as only the remaining length of original tail is needed for calculation.

RESULTS

Tail-break frequency

Tail-break frequencies in the three samples of *P.c. capensis* examined are presented in Table 1. The Orange Free State sample has the highest occurrence of broken tails. This could be explained in part by the fact that in this sample only, seemingly original tails were examined under magnification, allowing easier detection of regenerated tail tips.

Table 1. Tail-break frequencies in some African gekkonids. Data for samples of *P.c. capensis* examined during this study are in bold print.

Species or race	Habitat	% Tails broken	Sample size	Source of data
Palmatogecko rangei	terrestrial	16,7	24	Haacke 1976a
		19,0	82	Brain 1958
		20,4	294	Haacke 1976a
Kaokogecko vanzyli	terrestrial	18,0	61	Haacke 1976a
Ptenopus g. garrulus	terrestrial	21,1	399	Pianka & Huey 1978
		35,3	292	Haacke 1975
Chondrodactylus a. angulifer	terrestrial	24,1	427	Pianka & Huey 1978
		27,4	84	Haacke 1976c
Ptenopus carpi	terrestrial	26,1	46	Haacke 1975
Colopus wahlbergii	terrestrial	27,7	119	Pianka & Huey 1978
Chondrodactylus a. namibensis	terrestrial	28,9	38	Haacke 1976c
Hemidactylus mabouia	semi-arboreal	+40,0		Brain 1958
		64,5	31	Loveridge 1947
Lygodactylus c. capensis	arboreal	40,9	22	Pianka & Huey 1978
Colopus w. wahlbergii	terrestrial	41,4	142	Haacke 1976b
Ptenopus kochi	terrestrial	42,6	61	Haacke 1975
Pachydactylus bibronii	semi-arboreal	50,0	140	Pianka & Huey 1978
Pachydactylus c. capensis	semi-arboreal			
Kalahari		50,0	30	FitzSimons 1935
Southern Kalahari		52,8	89	Pianka & Huey 1978
Botswana / N. Transvaal		**51,5**	**97**	**Present study**
Pretoria		**52,9**	**70**	**Present study**
Orange Free State		**68,8**	**247**	**Present study**
Hemidactylus flaviviridis	arboreal	+50,0	200	Woodland 1920 (quoted from Loveridge 1947)
Colopus w. furcifer	terrestrial	56,0	50	Haacke 1976b
Pachydactulus m. maculatus	terrestrial	61,0	183	Branch 1982
Pachydactylus r. rugosus	arboreal	65,2	23	Pianka & Huey 1978
Phyllodactylus porphyreus	semi-arboreal	85,7	14	Rose 1950

As tail-break frequencies may be misleading when combined in mixed age groups (Turner, Medica, Jennrich & Maza 1982), size-class comparisons were made (Figure 4). In all samples, tail-break frequency tends to increase as snout-vent length increases. There was no evidence of tail breaks in the smaller specimens of each sample - Botswana / N.Tvl: 20-39mm SVL (N=17), Pretoria: 15-24mm SVL (N=9) and Orange Free State: 15-29mm SVL (N=7).

There was no significant difference in tail-break frequencies between samples collected from disused termitaria (67,6%; N=68) and among rocks (74,3%; N=144) in the Orange Free State ($P > 0,9$) (Figure 5).

In the Orange Free State sample of 63 males (37-56mm SVL), 79,4% (50) were regenerate-tailed, whereas 20,6% (13) had original tails. Of the 12 females (37-43mm SVL), 75,0% (9) had shed the tail, whereas 25,0% (3) had original tails.

FitzSimons (1943) and Rose (1950) state that bifurcation or even trifurcation of the regrown portion of the tail of geckos is not infrequent. Of all regenerate-tailed *P.c. capensis* examined for the Orange Free State (N=170), only three (1,8%) had bifurcate and one (0,6%) trifurcate tails. All Pretoria specimens had normal regenerates (N=40).

Tail size

Growth in length of the original tail relative to SVL is symmetric (Figure 6), whereas growth in width of the original tail relative to SVL suggests a partial trend towards allometric growth (Figure 7). Original tails are subcylindrical, verticillate and taper to a point. Judging from the longest regenerates, tails regenerated from near the base are usually shorter, but slightly wider at the base, than original tails.

Extent of caudal autotomy

The examination of all regenerate-tailed geckos from the Orange Free State (30-59mm SVL) revealed that 64,1% (N=170) had autotomized more than 80% of the original tail. The majority of geckos of 50-59mm SVL (81,8%; N=22) and 40-49mm SVL (66,7%; N=120) had more than 80% of the tail autotomized, as did 39,3% (N=28) of specimens in SVL class 30-39mm (Figure 8). In the sample of 170 specimens, 79,4% of all geckos had autotomized more than 60% of the tail [50-59mm SVL: 95,5% (N = 22); 40-49mm SVL: 81,7% (N = 120); 30-39mm SVL; 57,1% (N = 28)].

ADDENDUM

"Tail size"

Tail length and basal width were regressed against SVL, with probability values <0,05 recognized as significant. SVL did not significantly explain variation in tail length (r=0,12; P>0,05 in both O.F.S. and Pretoria samples), indicating symmetric growth. SVL did significantly explain 21,1% of variation in tail width when a linear model was fitted (r=0,46; P<0,0001) and 31,9% when a multiplicative model was fitted (r=0,56; P<0,00001). The linear model for this relationship is : tail width (mm)= 0,783 SVL - 8,32 and the multiplicative model is : tail width (mm) = 1,96 SVL to the power 0,34. Growth in tail width relative to SVL indicated allometric growth.

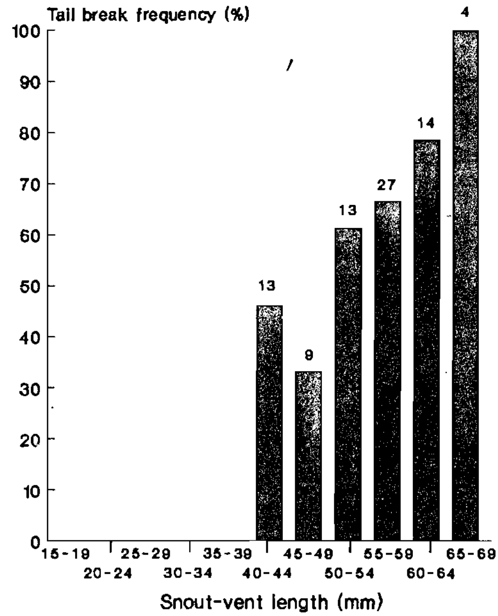

Figure 4a: Tail-break frequencies in a sample of *Pachydactylus c. capensis* from Botswana and northern Transvaal. Numbers above bars indicate sample sizes.

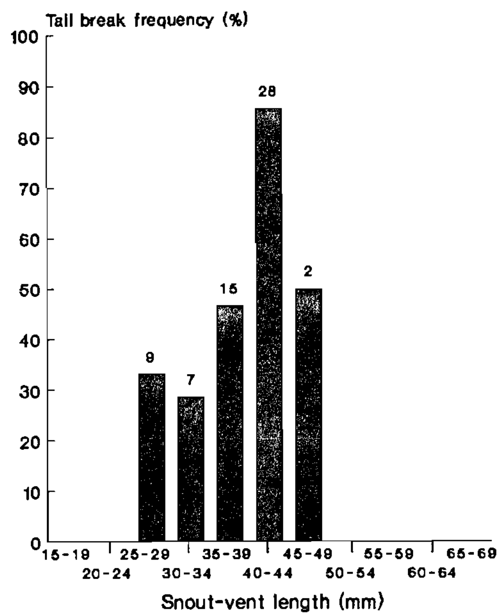

Figure 4b: Tail-break frequencies in a sample of *Pachydactylus c. capensis* from Pretoria. Numbers above bars indicate sample sizes.

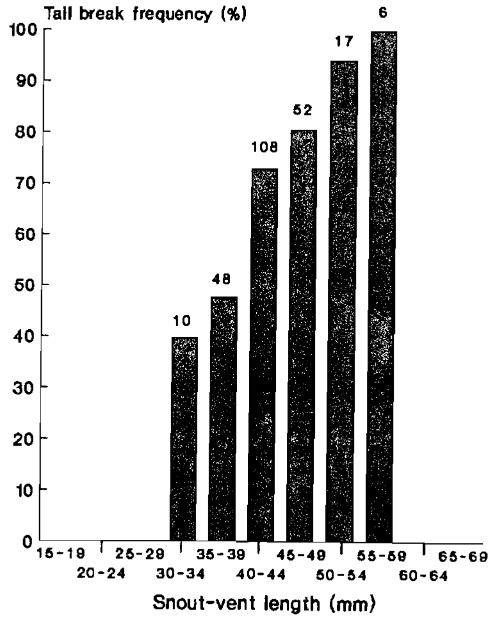

Figure 4c: Tail-break frequencies in a sample of *Pachydactylus c. capensis* from the Orange Free State. Numbers above bars indicate sample sizes.

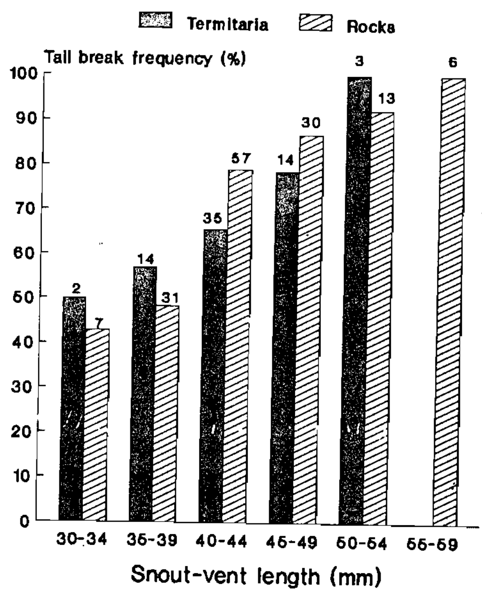

Figure 5: Tail-break frequencies in *Pachydactylus c. capensis* from two microhabitat types in the Orange Free State. Numbers above bars indicate sample sizes.

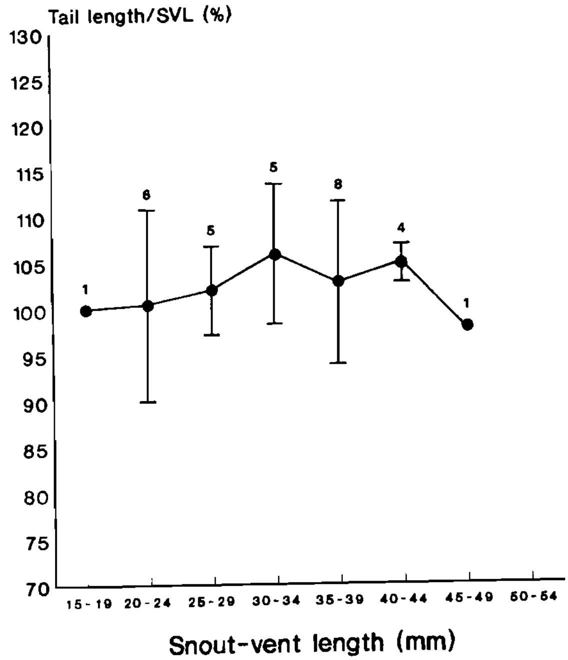

Figure 6a: Growth in tail length as a percentage of SVL in *Pachydactylus c. capensis* from Pretoria. Vertical bar = Ȳ ± 2 S.D. Numbers above bars indicate sample sizes.

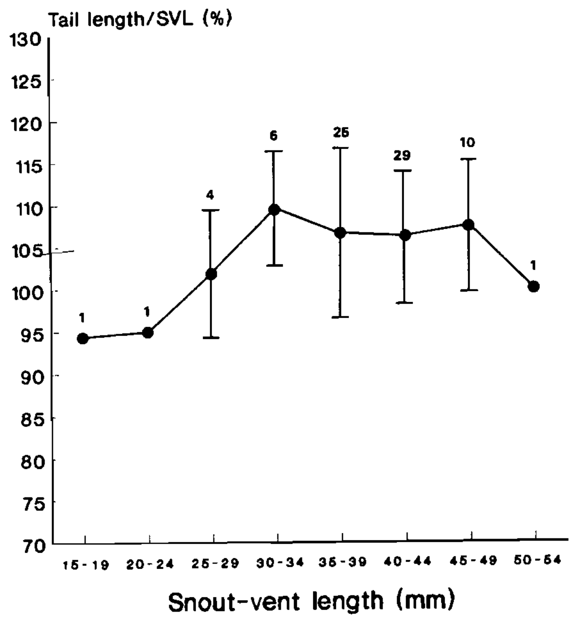

Figure 6b: Growth in tail length as a percentage of SVL in *Pachydacatylus c. capensis* from the Orange Free State. Vertical bar = Ȳ ± 2 S.D. Numbers above bars indicate sample sizes.

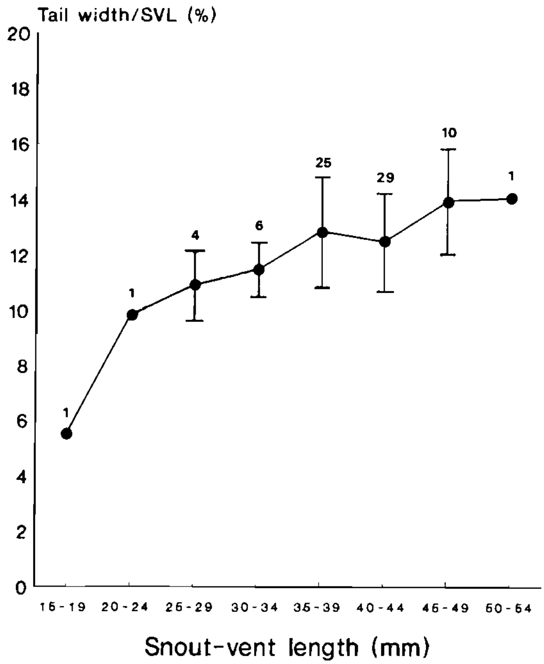

Figure 7: Growth in tail width as a percentage of SVL in *Pachydactylus c. capensis* from the Orange Free State. Vertical bar = $\bar{Y} \pm 2$ S.D. Numbers above bars indicate sample sizes.

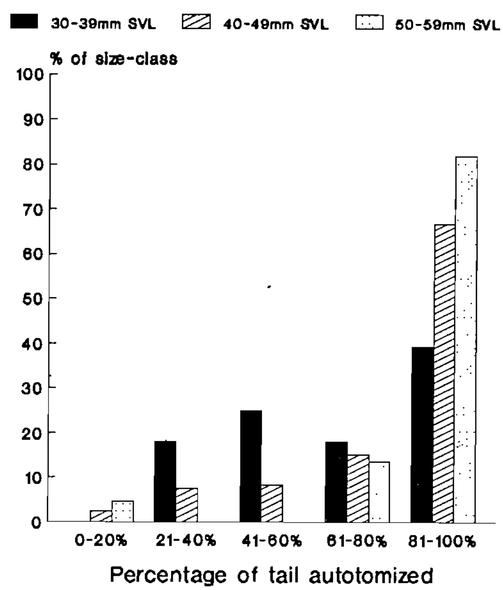

Figure 8: Percentage of tail autotomized in three size groups of *Pachydactylus c. capensis* from the Orange Free State.

DISCUSSION

The Cape thick-toed gecko is adapted to climbing and can be considered semi-arboreal (Pianka & Huey 1978). Tail-break frequency in *P.c. capensis* is relatively high when compared to most other African gekkonids (Table 1). The trend of higher tail-break frequencies in arboreal and semi-arboreal geckos is questionable, but may apply to African gekkonids (*cf.* Werner 1968; Pianka & Pianka 1976; Pianka & Huey 1978; Arnold 1984; 1988) (Table 1). The tail may be less important in the locomotion of lizards that climb habitually (Arnold 1984; 1988), and climbing species may be exposed to more intense predation and escape predators by caudal autotomy more effectively than terrestrial forms (Pianka & Huey 1978).

Tail-loss frequencies in the largest size classes of each sample of *P.c. capensis* are very high (Figure 4). The comparatively low tail-break frequencies among smaller specimens suggests that smaller geckos are often captured and eaten in their entirety, and that adults have survived predation more often. Juvenile geckos, bacause of their smaller size, can be tackled by a greater range of predators than adults (Arnold 1988). Juvenile geckos are often more delicately built than adults and likely to be slower (Arnold 1988). In addition, newly hatched or dispersing juveniles are unfamiliar with their immediate surroundings and cannot flee to refuges or otherwise evade capture with the speed and facility provided by detailed knowledge of a home range (Arnold 1988).

Microhabitat preferences may render some species or populations more susceptible to attack by predators because of their comparative conspicuousness to them (Jaksic & Fuentes 1980). Restriction to a microhabitat where the risk of predation is minimal is thus of great survival value to lizards (Bustard 1968). Comparison of tail-break frequencies between termitaria-dwelling and rock-dwelling *P.c. capensis* suggest similar predator pressure on both microhabitats (Figure 5).

The Cape thick-toed gecko has many predators, including snakes and small carnivores (Branch 1988). Broadley (1966) records three *P.c. capensis* in the stomach of a genet (*Genetta genetta*) and one in that of a mongoose (*Parancynctis selousi*). Predatory birds may also be important enemies. Bates (1988a) recorded two *Pachydactylus m. mariquensis* from the stomach of a Spotted eagle owl (*Bubo africanus*). Invertebrates such as spiders may also be important predators of geckos (Newlands & De Meillon 1986). The large Natal hunting spider (*Palystes natalius*) preys on *Pachydactylus m. maculatus*[3], often taking only the shed tail (Branch 1988).

In the Orange Free State, *P.c. capensis* has been recorded from the alimentary canal of six snake species, all of which inhabit both termitaria and rock crevices: *Lamprophis fuliginosus, Lycophidion c. capense, Crotaphopeltis hotamboeia, Psammophylax tritaeniatus, Psammophis notostictus* and *Psammophis leightoni trinasalis* (De Waal 1978), with at least nine other

3 Branch (1988) treats both *Pachydactylus m. maculatus* and *P.m. oculatus* as distinct species.

potential snake predators. In an independent study in the central Orange Free State, Lynch (1986) found reptiles in 23,2% of disused termitaria opened, with *P.c. capensis* and its potential predators *Lamprophis fuliginosus* and *Lycophidion c. capense* the most abundant reptiles. The tunnels within termite mounds of *Trinervitermes trinervoides* vary in size and shape, from round holes of 10 mm in diameter, to oblong passages of 7 x 20 mm and larger passages of 30 x 20 mm (Lynch 1986), and provide countless escape routes for resident geckos. Personal observations on the movement of certain gecko-eating snakes (*Lamprophis fuliginosus, L. aurora* and *Crotaphopeltis hotamboeia*) through these tunnels does, however, indicate that these snakes are capable of pursuing and capturing the relatively slow-moving *P.c. capensis* within these mounds. Rock-dwelling geckos have many retreats in the cracks in and between rocks, but also share their habitat with many snake species (De Waal 1978).

Tail loss may occur as a result of intraspecific conflicts, but this is most common among males of species that actively employ their tails as weapons during territorial fighting (Schoener & Schoener 1980; Arnold 1984; 1988). Aggressive encounters between male geckos in captivity have been reported, often involving head and neck biting (Bustard 1965; Zaworski 1987; 1988). Male *Gekko gecko* occassionally bite off the tails of other males and may even consume them (Zaworski 1987; 1988). Head and neck biting has been observed in captive *P.c. capensis* (Bates 1988b), but no cases of tail biting or tail-loss through intraspecific fighting were observed or have been recorded. Vitt *et al.* (1977) suggest that avoidance, rather than intraspecific fighting, should be the most likely response between conspecific lizards under natural conditions. However, the importance of intraspecific conflict as a factor in tail-loss can only be properly assessed by field observation (Arnold 1984; 1988). Unsuccessful predatory attacks are possibly the primary cause of tail-loss in *P.c. capensis*.

To function effectively as a deterrent, the tail of a lizard must visually distract a predator by its size and movement. Large tails could assist geckos in distracting predators away from the body (Daniels, Flaherty & Simbotwe 1986). The original tails of *Phyllodactylus marmoratus* become relatively longer and wider as SVL increases, and adults have tails with a greater absolute and relative mass than smaller geckos (Daniels *et al.* 1986). These authors suggest that the greater relative mass of adult tails increases their distractive capacity during lateral tail waving. Presumably they were referring to the greater relative size (volume) of such tails, as "mass" cannot visually distract a predator. The relatively greater basal tail width of original tails of adult *P.c. capensis* may increase the distractive capacity of these tails by their greater relative size. The tails of larger geckos may thus be more frequently involved in deterring predators, contributing to the higher tail-break frequencies among larger geckos.

Lee (1975) found allometric growth in tail length of *Xantusia h. henshawi*, and suggested an ontogenetic change in the importance of the tail as an organ for fat storage, or changing demands on the tail as an organ of balance during locomotion. Daniels *et al.* (1986) state that the comparative ineffectiveness of autotomy for juvenile *Phyllodactylus marmoratus* was not related to either small body size or differences in avoidance behaviour, but probably due to changes in tail size and composition.

The size and shape of the neomorph tail should also be considered when investigating the effect of the tail in deterring predators. This becomes apparent when considering the high tail-break frequencies in the three samples examined and the possible occurrence of multiple tail breaks. Interspecific differences exist in the relative size of original to regenerated tails in lizards, and in species where tail autotomy is most important for predator escape, regenerated tails are as large, or larger than, original tails (Vitt *et al.* 1977).

Fat storage in the tail of gekkonids is widely reported, but has yet to be investigated in the genus *Pachydactylus*. By starving samples of *Phyllodactylus marmoratus* (only water provided), Daniels (1984) found that tailless geckos survived for an average of 49,2 days, original tailed geckos for 90,4 days and geckos with fully regenerated tails for as long as 142,4 days. Regenerated tails contained more energy and lipids than original tails in three of four lizard species studied by Vitt *et al.* (1977).

The extent of caudal autotomy in southern African geckos has been poorly documented. Restriction of autotomy to the tail base occurs in a number of gekkonids, particularly terrestrial forms occupying arid habitats (Arnold 1984). Southern African geckos in which autotomy occurs only at the base include *Pachydactylus mariquensis* (Arnold 1984), *Palmatogecko rangei* and *Kaokogecko vanzyli* (Haacke 1976a), whereas *Colopus w. wahlbergii* and *C. w. furcifer* usually autotomize from the base (Haacke 1976b). Autotomy can occur at any point between the tip of the tail and the base in the following southern African geckos: *Ptenopus g. garrulus, P. kochi, P. carpi* (Haacke 1975), *Chondrodactylus a. angulifer* and *C.a. namibensis* (Haacke 1976c).

In the sample of *P.c. capensis* from the Orange Free State, 79,4% of specimens had autotomized more than 60% of the tail, whereas 64,1% had autotomized more than 80% of the tail. Even among the smallest and presumably youngest regenerate-tailed geckos (30-39mm SVL), the proportion of tail autotomized was more than 60% in 57,1% of specimens. Autotomy therefore frequently results in the loss of a large proportion of the tail (whole-tail autotomy) in this gecko, although it can occur throughout the length of the tail (partial autotomy) (Figure 8). As 42,9% of geckos of 30-39mm SVL (N = 28) had autotomized less than 60% of the tail, there is evidence that economy of autotomy can occur in *P.c. capensis*. Daniels (1985) found that in a natural population of *Phyllodactylus marmoratus* with mature regenerated tails, the regenerated portion comprised more than 65% of the tail length in the majority of specimens. He found no significant difference in the percentage of tail autotomized between juveniles and adults and suggested that whole-tail autotomy occurs frequently in natural populations.

As lizards cannot autotomize at any site along the regenerated length of the tail except at the junction with the original portion or further anteriorly (Rose 1950; Etheridge 1967), repeated autotomies could increase the proportion of tail autotomized. Young geckos, having been exposed to predation for a shorter period of time, and having a comparatively slow rate of tail regeneration (Congdon, Vitt & King 1974; Ballinger & Tinkle 1979), are less likely to have autotomized and regenerated their tails more than once (Daniels 1985). Larger and presumably older geckos would have been exposed to predation for a longer period and are more likely to have experienced multiple tail breaks. This probably explains why the percentage of tail autotomized tends to increase with increasing SVL (Figure 8). Branch (1988) reports that most adult Spotted geckos (*Pachydactylus m. maculatus*) lose their tails at least once, but sometimes up to three times.

The loss of a large portion of the tail may be more effective in retaining the attention of a predator (Arnold 1984; 1988). When removed at the base, the original tails of *P.c. capensis* continued to actively thrash about for 2,7 to 4,7 minutes (unpublished data), during which time a predator may be distracted from the body of the lizard. The loss of a small section of the tail may be due to "non-predatory assaults" such as ant-bites or trapping the tail between physical elements of the microhabitat (Daniels 1985).

Daniels (1983) determined that running speed is increased when the tail of *Phyllodactylus marmoratus* (a similar-sized gecko) is shed, and hypothesized that increased running speed partially compensates for the temporary loss of the tail. Conversely, tail loss reduces running speed in many cursorial lizards where the tail is essential as a counterbalance in running (Arnold 1984; 1988).

A high tail-break frequency in lizards, as in *P.c. capensis*, may indicate the inefficiency of predators at making effective contacts (Simbotwe 1983; Medel, Jiménez, Fox & Jaksic 1988), but also indicates the success of the caudal autotomy defence mechanism.

OPSOMMING

Geitjies vanaf drie verskillende lokaliteite in suidelike Afrika (Botswana/noord Transvaal, Pretoria en Oranje-Vrystaat) se sterte is ondersoek vir afgewerpte stert frekwensies, stert grootte en omvang van kaudale afwerping. In vergelyking met ander Afrika Gekkonidae is die stertafwerpingfrekwensies relatief hoog (51,5%; 52,9%; 68,8%), wat 'n aanduiding is van die efektiwiteit van kaudale afwerping as verdedigingsmeganisme teen predatore. In die kleiner eksemplare is geen gebreekte sterte waargeneem nie waarna die frekwensie van stertafwerping 'n toename begin toon het met toename in liggaamslengte. Die toename in die persentasie stert wat afgebreek het relatief tot toename in liggaamslengte dui op 'n hoë voorkoms van veelvuldige stertafwerpings. Die stertafwerpingfrekwensies van eksemplare vanaf twee mikrohabitatte in die Oranje-Vrystaat het geen verskille getoon nie. Oorspronklike sterte se lengtegroei relatief tot liggaamslengte dui op simetriese groei, terwyl die wydtegroei relatief tot liggaamslengte aanduidings van gedeeltelikke allometriese groei toon. In die Oranje-Vrystaat het 64,1% van die eksemplare met geregenereerde of geregenererende sterte meer as 80% van die stert afgewerp, wat daarop dui dat algehele stertafwerping algemeen in die natuur voorkom. Die afwerping van korter stukkies stert mag meer ekonomies wees maar is miskien minder effektief om predatore te flous.

ACKNOWLEDGEMENTS

I wish to thank Mr. J.H. van Wyk and Mr. J.P. Watson of the National Museum for their support and advice during this study. Special thanks to Dr. D.G. Broadley for supplying data on tail-break frequencies of specimens in the Natural History Museum of Zimbabwe. Dr. C.D. Lynch and Mr. R.M. Douglas of the National Museum are thanked for commenting on the draft manuscript. The sub-specific status of a sample of geckos from the Pretoria area was confirmed by Mr N.H.G. Jacobsen of the Transvaal Nature Conservation Division. Staff in the Radiology department of Universitas Hospital, Bloemfontein, are thanked for X-raying lizard tails. Miss A. Lombaard is thanked for typing the draft manuscripts.

Dr. W.R. Branch of the Port Elizabeth Museum, Port Elizabeth and Mr. A.J.L. Lambiris of Natal Parks Board, Pietermaritzburg, acted as referees and are thanked for their valuable comments which led to the improvement of the paper.