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Ecological parasitic infestation by *Eutrombicula alfreddugesi* (Acari: Tombiculidae) in *Tropidurus hygomi* (Squamata: Tropiduridae) from a Restinga habitat, Brazil northeastern

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Abstract.*—In this study, we sought to investigate the parasitic relationship between chigger mites and the reptilian host *Tropidurus*. Despite its frequent occurrence, current knowledge about this relationship remains limited, mainly regarding biotic (sex and life stage of the host) and abiotic (climate) factors. We collected *Tropidorus hygomi* specimens every month for one year (September 2020 to August 2021) in a conserved restinga area in northeastern Brazil. The hosts underwent biometric analysis, and their body surfaces were inspected for ectoparasites. We estimated ectoparasite prevalence and mean infestation intensity, including for host life stage and sex. We applied a multiple response permutation procedure (MRPP) to assess the statistical significance of infestation patterns for host life stage, sex, and seasonality. We estimated the body condition indices for each individual and used these values to infer their relationship with their respective parasitic loads. We recorded a prevalence of 97.4% for the chigger mite *Eutrombicula alfreddugesi* and a mean intensity of 49.40 ± 3.76 mites (range, 1–313), high rates consistent with those recorded for congeners of the host. Adult males were significantly more infested, and mite pockets were the sites with the highest infestation prevalence (96.89%) and intensity (45.02 ± 3.49). The patterns observed here can be explained mainly by the morphological characteristics of mite pockets owing to the sit-and-wait behavior of *T. hygomi* and mite biology. Our findings provide a clearer understanding of the close evolutionary relationship between *E. alfreddugesi* and *T. hygomi* without negative impacts on the host body.

Keywords. Chigger mites, Ectoparasitism, Lizards, Mite pockets, Parasitological patterns

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Introduction

Parasites play important roles in population dynamics and species interactions, influencing the survival and fecundity rates of hosts, thereby influencing intrinsic processes in host communities (Anderson, 2000; Townsend et al., 2009). In addition, ecological studies of parasites are important for understanding the processes that influence parasitic structures, considering host ecology (Oitaven et al., 2019; Poulin, 2007), making it essential to investigate the natural history of host–parasite relationships (Anjos et al., 2011; Pollock & John-Alder, 2020).

Mites of the Trombiculidae family are globally distributed (Chen et al., 2022; Stekolnikov, 2018). They pierce the epidermis and dermis of their hosts until they reach the connective tissues (Kudryashova, 1998; Shatrov, 2000). The Trombiculidae family includes the genus *Eutrombicula*, which commonly infests arthropods, birds, mammals, amphibians, and reptiles (Ewing, 1944;

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Ludwig et al., 1985; Mertins et al., 2011). Members of Trombiculidae, including *Eutrombicula alfreddugesi*, commonly use Neotropical lizards as hosts (Cunha-Barros & Rocha, 2000; Cunha-Barros & Rocha, 1995; Zippel et al., 1996), such as *Tropidurus* spp. (Carvalho et al., 2006; Rocha et al., 2008; Rocha et al., 2020).

One of the main characteristics distinguishing lizard species from the genus *Tropidurus* is the so-called mite pocket (Rodrigues, 1987). Mite pockets are deep dermal folds with a thin integument covered by granular or reduced scales (Rocha et al., 2008; Rodrigues, 1987), which facilitates parasitism by mites (Menezes et al., 2011). *Tropidurus hygomi* Reinhardt and Lütken, 1862 is an endemic species of the restinga biome, with a restricted distribution from Salvador (Bahia) to Santo Amaro das Brotas (Sergipe) (Martins et al., 2018; Silva & Tinoco, 2021; Travassos et al., 2015). This species is classified as vulnerable (VU), according to the IUCN Red List (IUCN, 2025).

Parasite–host relationship patterns vary according to factors inherent to the life history and biological traits for both parasite and host, as well as climatic and environmental factors (Amo et al., 2005; Goldberg & Bursey, 1991; Pollock & John-Alder, 2020), including host ontogeny, age-associated changes to body size, available resource exploitation, physiological capacity, and host behavior (Amo et al., 2004; Dudek et al., 2016). This is supported by the idea that parasite rates increase according to host body size (Amo et al., 2004, 2005; Oitaven et al., 2019; Townsend et al., 2009; Zuk & McKean, 1996). Climate and environmental changes in turn tend to directly influence environmental heterogeneity, exploitation of available resources by different species, and their life cycle and behavior, directly affecting parasite–host relationships (Brito et al., 2014; Garrido & Pérez-Mellado, 2013; Klukowski, 2004; Salkeld & Schwarzkopf, 2005).

Despite the well-known taxonomy and ecological behavior regarding microhabitat use (Martins et al., 2010; Vargens et al., 2008) and diet (Silva & Tinoco, 2021; Travassos et al., 2015) of *T. hygomi*, its host–parasite relationships remain unknown. The study of these ecological aspects is essential for developing environmental protection plans, as ecosystems such as the restinga are gravely threatened by urban growth, as well as other activities such as industry and agriculture, with less than 1% comprising the original ecosystem (Andrade et al., 2024; Couto-Ferreira et al., 2011; Tinoco, 2019).

Since host–parasite relationships can be influenced by many host characteristics such as morphology (weight and body length), sex, and seasonal variations (dry and rainy seasons), we hypothesized that parasitological indices increase according to host morphology, with males displaying indices different from those of females. We further hypothesized that these variables could vary seasonally because of the dry and rainy seasons at the study site. Therefore, in the present study, we investigated the parasitic relationship between *E. alfreddugesi* mites and *T. hygomi*, verifying the influence of host sex and life stages (neonates, juveniles, and adults), as well as seasonality, to bridge the knowledge gaps regarding this parasite–host relationship. We tested the following hypotheses: (1) males have higher parasitism rates, regardless of life stage; (2) adults have higher parasitism rates than those of neonates and juveniles, regardless of sex; and (3) rates of parasitism are higher during dry periods than during rainy periods.

Materials and Methods

Study site

The study was carried out in the natural areas of the Condomínio Busca Vida (CBV), Camaçarí municipality (−12.8653°S, −38.2788°W), Bahia state, northeastern Brazil (Figure 1). The CBV comprises 255 ha of restinga and is composed of four physiognomies typical of this ecosystem: beach vegetation, floodplains, scrub vegetation, and restinga dry forest. This area has one of the highest conservation statuses in the southern portion of the northern coast of Bahia because of its history and land-use planning (Tinoco, 2019).

Collection and processing of hosts and ectoparasites

Tropidurus hygomi individuals were captured by SISBIO (No. 75659-4), as approved by the Ethics Committee for the Use of Animals of the Universidade Federal Rural de Pernambuco (CEUA UFRPE 132/2019). We collected *T. hygomi* individuals manually through an active search, with collections made by unless a pair of observers, totalizing 360h/men of sampling effort. Searches were conducted monthly from September 2020 to August 2021. Juvenile individuals were classified as those with a snout–vent length (SVL) shorter than 40 mm, and male individuals displayed an absence of black spots on the ventral surface of the thighs near the cloaca. Adult females, on the other hand, were considered juveniles when the SVL was between 40 and 54 mm and adults when the SVL was longer than 54 mm. The measurements used to define the life stages were based on Siqueira et al. (2019), Tinoco (2019), and (Bonfim et al., 2021). All individuals were later confirmed by dissection and checking the gonads.

After the capture, we weighed the individuals using a digital scale (0.001 g). We then euthanized the animals using lethal dose of ketamine (10 mg/kg + 0.1–0.3 mg/kg), fixed them in 10% formalin, and preserved them in 70% alcohol. All euthanasia procedures were performed in accordance with internationally recognized animal welfare standards for reptiles, following the recommendations of the AVMA Guidelines for the

Euthanasia of Animals. The methods were approved by the Institutional Animal Research Committee of Universidade Federal Rural de Pernambuco (CEUA UFRPE 132/2019).

We performed these procedures as quickly as possible, preferably while still in the field, to mitigate possible recording errors caused by mite movement while the animals were still alive. After euthanasia, we inspected *T. hygomi* individuals using a stereomicroscope to investigate the presence of mites in the body. The mites were quantified while still on the host's body, collected, and stored in 70% alcohol. The mites were mounted on slides using Hoyer's medium (Walter & Krantz, 2009) for subsequent taxonomic identification. We recorded data only for *E. alfreddugesi* infestation sites, according to Rocha et al. (2008): (1) head, (2) tympanum, (3) lateral neck mite pockets, (4) shoulders, (5) forelimbs, (6) armpits, (7) venter, (8) dorsum, (9) inguinal region, (10) hindlimbs, (11) post-femoral region, (12) cloacal region, (13) ventral tail, and (14) dorsal tail.

We captured 193 *T. hygomi* individuals and collected 9288 *E. alfreddugesi* mites. Half of the hosts were deposited in the UFRPE Herpetological and Paleoherpetological Collection, whereas the other half were deposited in the UCSal Animal Ecology and Conservation Center (ECOA). The parasites were deposited in the Parasitological Collection of the Parasitology Laboratory (at the Universidade Federal Rural de Pernambuco (UFRPE).

We measured accumulated precipitation data (mm), average temperature (°C), and relative humidity (%) on each sampling day using the Meteorological Data Bank for Teaching and Research (BDMEP) of the National Institute of Meteorology (INMET, 2025). By evaluating the climatic variability throughout the sampling year, we grouped the months from September to March as the dry season and April to August as the rainy season. The "dry season" was so named for reasons of categorization on the basis of differences in rainfall volume. In the studied environment, however, it should be noted that rainfall is constant throughout the year and as such, there is no proper "dry season."

Data analysis

The prevalence and mean infestation intensity were estimated according to the method described by Bush et al. (1997). For *E. alfreddugesi*, we determined the

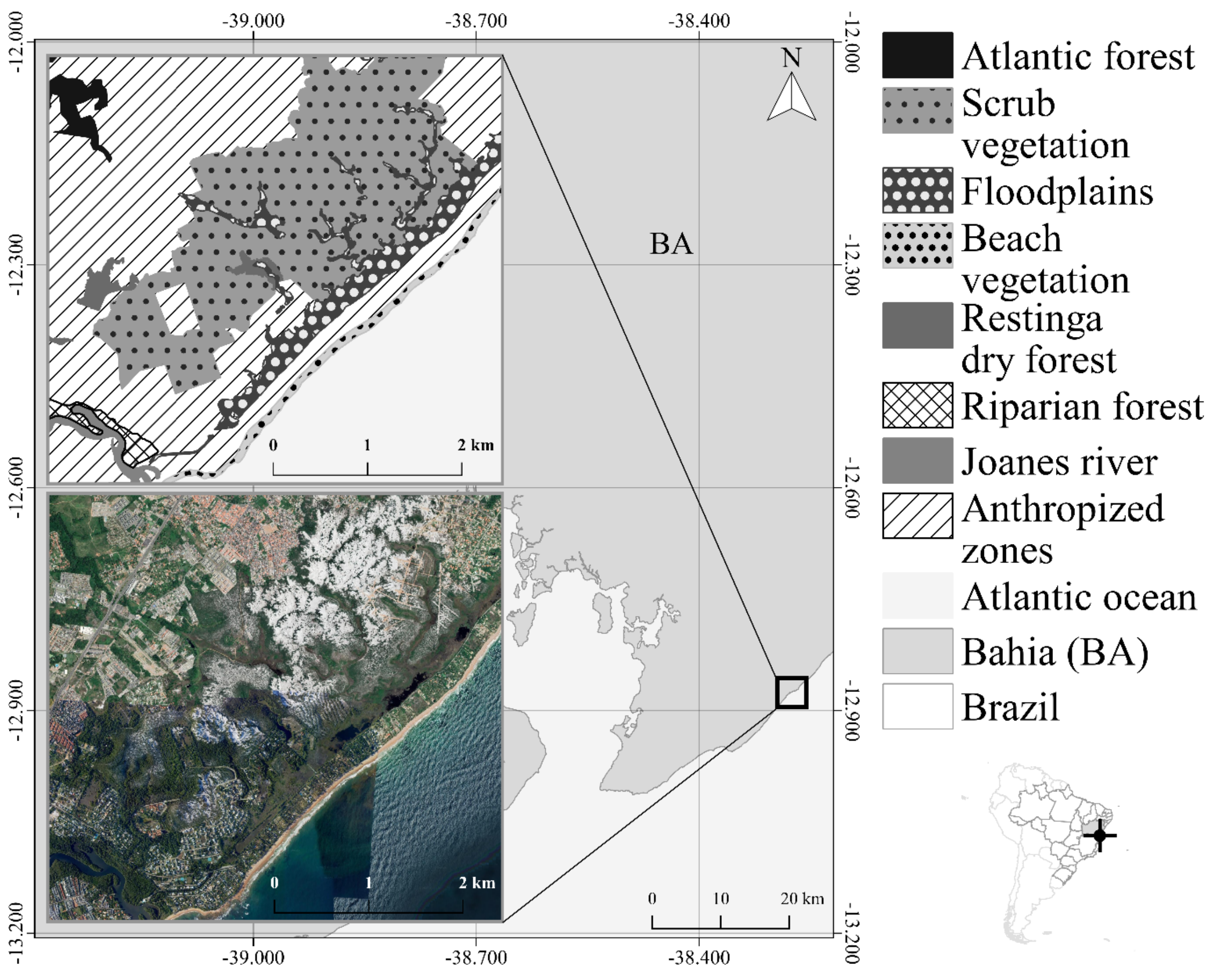

Fig. 1: Location map of Bahia state, Salvador municipality in Brazil, with landscape components and location of Condomínio Busca Vida. Image by: Mateus Bonfim.

Table 1. Prevalence values, Mean intensity and Standard error (± SE) and amplitude of infestation by *Eutrombicula alfreddugesi* in *Tropidurus hygomi*, according to life stage and sex, in Restinga fragment, from September 2020 to August 2021, Bahia state, Brazil Northeastern.

	Prevalence (%)	Mean intensity (± SE)	Intensity
General	97.4	49.40 ± 3.76	1 – 313
Neonates	88.09	17.13 ± 8.41	1 – 63
Juveniles	100	39.28 ± 5.93	1 – 140
Adults	100	75.57 ± 6	2– 313
Males	100	70.59 ± 6.01	2– 169
Females	100	44.54 ± 5.87	1– 313

following parasitic ecological indices: prevalence (host infested by determinate parasite/total analyzed hosts × 100), mean intensity of infestation (total number of parasitic species/infested hosts), and mean abundance of infestation (total number of parasitic species/numbers of analyzed individuals).

To analyze the influence of different factors, we analyzed all datasets using recombinant matrices, and the normality was verified using the Kolmogorov–Smirnov test. After the data were confirmed by nonparametric tests, we used a multi-response permutation procedure (MRPP) analysis to test the differences in *E. alfreddugesi* infestation between host, sex, host life stage, and seasons to investigate the existence or absence of a statistically significant difference in *E. alfreddugesi* infestation. We used principal coordinate analysis (PCoA) to correlate both biotic (sex and life stage) and abiotic (seasonality) traits with the infestation rates of *E. alfreddugesi* in *T. hygomi*. Permutation analyses were performed to test the influence of each factor on the parasite infestation rate, using each factor correlated with the mites in the main matrix (McCune & Grace, 2002). We displayed the relationship considering each factor using PCoA graphics, reinforced by the significance of the MRPP test, demonstrating their respective reach and overlap, as well as their relevance for infestation rates.

Morphometric variables were converted into logarithms to smooth out the amplitude discrepancies in the different measurements used (Green, 2001) and from the residual of the regression between SVL (independent variable) and host weight (dependent variable) to obtain the body condition index (BCI). Host BCI values (dependent variable) were compared with *E. alfreddugesi* infestation intensity values (independent variable) using a linear multiple regression test to obtain the coefficient of determination (R^2) from the regression analysis. For all analyses, we used RStudio (v5.1.3 R Development Core Team 2025), considering a significance level of $p < 0.05$.

RESULTS

Of the *T. hygomi* specimens collected, 42 were neonates, 76 were juveniles, and 75 were adults. In the later stages, 77 females (39 juveniles and 38 adults) and 74 males (37 juveniles and 37 adults) were recorded. Overall, 188 individuals (97.4%) were infested with *E. alfreddugesi* mites, with a mean intensity and standard error (SE) of 49.4 ± 3.76 (range, 1–313). According to the life stage, we noticed that all juveniles and adults were infested, whereas the infestation prevalence in neonates was 88.09%. The prevalence and mean infestation intensities are shown in Table 1.

Among the investigated infestation sites, neck mite pockets showed the highest prevalence (96.89%), followed by the venter (43%), indicating that these specialized skin folds are the preferred sites, with mites spreading and establishing themselves among the exposed areas. The other infestation sites showed prevalence values much lower than those reported previously (Figure 2 and Table 2).

MRPP analysis confirmed a high association of infestation rate for *E. alfreddugesi* in *T. hygomi* regarding life stage (A = 0.120; T = −22. 221; $p < 0.001$), indicating that infestation rates increased as host morphology and life stage increased. Furthermore, pairwise analysis indicated that all life stage categories presented statistically significant differences for infestation by trombiculid mites, displaying heterogeneity and distance between the different life stages. In the PCoA analysis, 97.86% of the data variance was explained along the first axis (Figure 3A). Infestation patterns according to life stage were observed to overlap, except for a few individuals who presented more divergent and distant data from others, positioning themselves at more extreme locations on the graph. Regarding life stage, we recorded significant variations between the initial stages (neonates and juveniles) (A = 0.094; T = −14.088; $p < 0.001$) and between the adult stages for both neonates (A = 0.157; T = −23.934; $p < 0.001$) and juveniles (A = 0.045; T = −9.359; $p < 0.001$).

The MRPP analysis also revealed a significant difference in infestation rates for both seasonality (A = 0.01; T = 0.01; $p = 0.02$) and sex (A = 0.023; T = −4.82; $p = 0.03$). Additionally, both factors displayed heterogeneous and relatively close data between the groups. Similarly, PCoA analysis explained 97.87% of the data variance considering the dry and rainy seasons (Figure 3B), as well as 97.65% of the data variance along the first axis regarding host sex (Figure 3C). The same, mostly overlapping pattern, with a few individuals presenting distant and discrepant data, including life

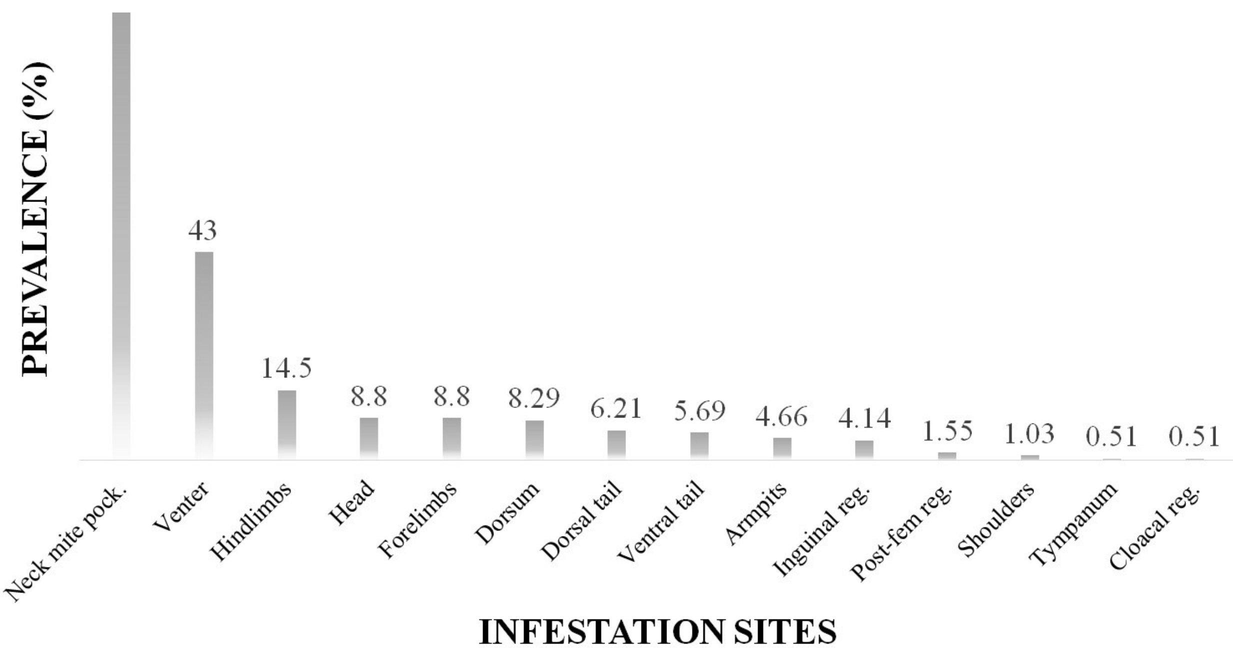

Fig. 2. Prevalence values of infestation by *Eutrombicula alfreddugesi* at each site in the body of *Tropidurus hygomi*: (Neck mite pock.) Lateral neck mite pockets; (Inguinal reg.) inguinal region; (Post-fem. reg.) Post-femoral region; (Cloacal reg.) Cloacal region, from September 2020 to August 2021 in Condomínio Busca Vida, Bahia state, Brazil northeastern.

Table 2. Prevalence (P; %) and Mean intensity and standard error (MI ± SE) values for *Eutrombicula alfreddugesi* in *Tropidurus hygomi* in infestation sites, according to life stage and sex: *Tropidurus hygomi*; (neo.) neonates; (juv.) juveniles; (adu.) adults; (mal.) males; (fem.) females, from September 2020 to August 2021 in Condomínio Busca Vida, Bahia state, Brazil northeastern.

Body sites	P. *T. hyg* (%)	MI. *T. hyg* (± SE)	P. Neo (%)	MI. Neo. (± SE)	P. Juv (%)	MI. Juv (± SE)	P. Adu (%)	MI. Adu (± SE)
Head	8.8	1.17 ± 0.03	0	0	14.47	1.09 ± 0.03	8	1.33 ± 0.09
Tympanum	0.51	1	0	0	1.31	1	0	0
Neck pockets	96.89	45.02 ± 3.49	85.71	15.94 ± 2.35	100	36.27 ± 3.29	100	67.84 ± 7.14
Shoulders	1.03	1 ± 0	2.38	1	0	0	1.33	1
Forelimbs	8.8	1.76 ± 0.09	2.38	1	5.26	1.5 ± 0.06	16	1.91 ± 0.18
Armpits	4.66	7.88 ± 1.32	4.76	1 ± 0	2.63	1 ± 0	6.66	13.4 ± 2.75
Venter	43	6.3 ± 0.49	11.9	3.4 ± 0.47	35.52	3.85 ± 0.38	68	7.88 ± 0.90
Dorsum	8.29	1.62 ± 0.13	9.52	1.25 ± 0.08	5.26	2.75 ± 0.40	10.66	1.25 ± 0.08
Ing. reg.	4.14	2.12 ± 0.17	2.38	2	3.94	1 ± 0	5.33	3 ± 0.38
Hindlimbs	14.5	3.14 ± 0.25	4.76	2.5 ± 0.11	11.84	3.66 ± 0.66	22.66	2.94 ± 0.19
Post-fem reg.	1.55	2 ± 0.12	4.76	2.5 ± 0.34	0	0	1.33	1
Cloacal region	0.51	7	2.38	7	0	0	0	0
Ventral tail	5.69	4.27 ± 0.29	2.38	4	10.52	5.12 ± 0.51	2.66	1 ± 0
Dorsal tail	6.21	2.58 ± 0.19	4.76	5.5 ± 1.04	7.89	2.66 ± 0.17	5.33	1 ± 0

stage, can also be seen in the PCoA considering host sex. In summary, despite individuals displaying infestation during the dry season, with males displaying higher infestation rates than females, neither factor represented a determinant condition for *E. alfreddugesi* infestation.

Because the MRPP analysis exhibited a fair distance regarding life stages, we performed linear regression using this factor. Linear regression (r^2) showed a positive correlation for adults and a slightly negative correlation for juveniles. In adults, despite the low correlation, the variation was highly significant ($r^2 = 0.30$; Df = 73; $p <$ 0.001), indicating that as SVL increased, the prevalence of *E. alfreddugesi* also increased (Figure 4A). Meanwhile, juveniles did not display significant variation ($r^2 = -0.01$; Df = 74; $p = 0.97$), indicating that juveniles have a rather fixed *E. alfreddugesi* prevalence (Figure 4B).

Discussion

The infestation patterns confirmed here for *E. alfreddugesi* in *T. hygomi* can be explained by the ecological, morphological, evolutionary, and biological

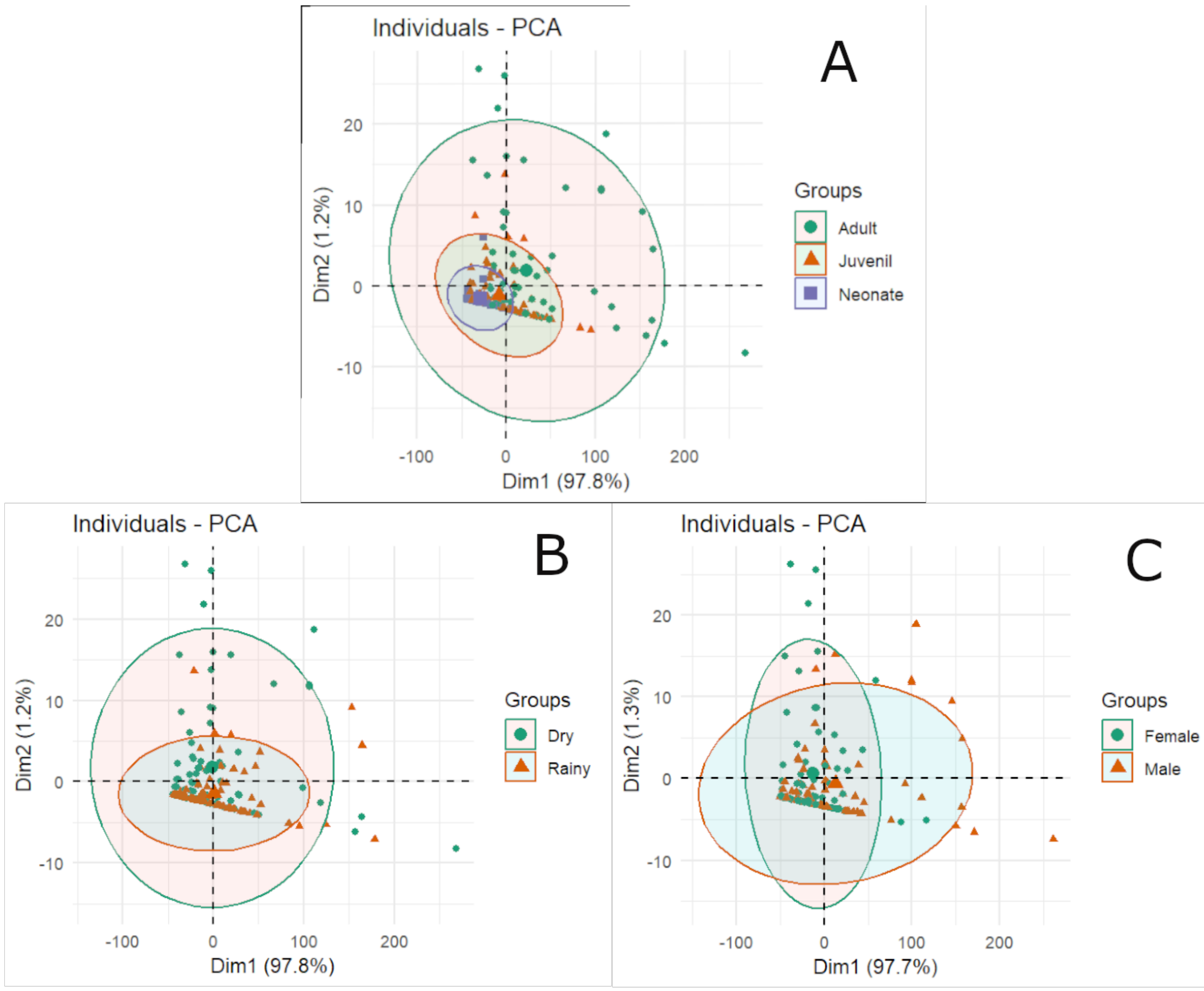

Fig. 3. Principal coordinate analysis (PcoA) for infestation by *Eutrombicula alfreddugesi* in *Tropidurus hygomi* from September 2020 to August 2021 in Condomínio Busca Vida, Bahia state, Brazil northeastern, as a function of life stage, regarding distinct categories: (A) Life stage: neonate; juveniles and adults. (B) season: dry and rainy. (C) gender: females. Infestation sites: (RPF) post-femoral region; (CAV) ventral tail; (CAD) dorsal tail; (MPO) hindlimbs; (BGL) lateral neck mite pockets; (MAN) forelimbs; (APO) inguinal region; (AAN) armpits; (RCL) cloacal region; (TIM) tympanum.

aspects inherent to both the parasite and the host. Studies involving host–parasite relationships have also revealed a pattern of population dynamics and ecological interactions in restinga remnants, including the influence of biotic and abiotic factors (Anjos et al., 2011; Oitaven et al., 2019).

The total prevalence of *E. alfreddugesi* infestation in *T. hygomi* was relatively high, corroborating previous studies on other *Tropidurus* species, such as *T. torquatus* in restinga localities (Cunha-Barros & Rocha, 2000; Rocha et al., 2020); *T. itambere* in Cerrado; and *T. oreadicus* (Carvalho et al., 2006), *T. cocorobensis*, *T. erythrocephalus*, *T. hispidus*, and *T. semitaeniatus* in Caatinga domains and rupestrian fields (Menezes et al., 2011). The mean infestation intensity of *E. alfreddugesi* in *T. hygomi* also seems to be similar to that of congener hosts, including *T. cocorobensis*, *T. semitaeniatus*, *T. itambere*, and *T. torquatus*, mainly regarding the studied populations from restinga areas (Carvalho et al., 2006; Menezes et al., 2011).

A wide richness and diversity of mites, with a direct life cycle (monoxene), appear to be typical in lizards (Ávila et al., 2012; Oitaven et al., 2019). The ecological and morphological traits of host and parasite may explain the high prevalence and recorded infestation intensity. *Tropidurus hygomi* is a sit-and-wait forager (Martins et al., 2018) that is closely associated with sandy substrates (Martins et al., 2010). This combination makes it particularly susceptible to infestation by *E. alfreddugesi*, as the parasite is acquired through direct contact (Conover et al., 2015), with the static host behavior facilitating access of the parasite larva to its body (Cunha-Barros et al., 2003). The body of *T. hygomi* is covered with imbricated scales and mite pockets (Rodrigues, 1987), which appear to facilitate mite fixation (Cunha-Barros & Rocha, 2000; Delfino et al., 2011). This explains the high prevalence and intensity of parasitism observed in the present study.

Regarding individual body sites, mite pockets were the most prevalent and highest-intensity infestation sites

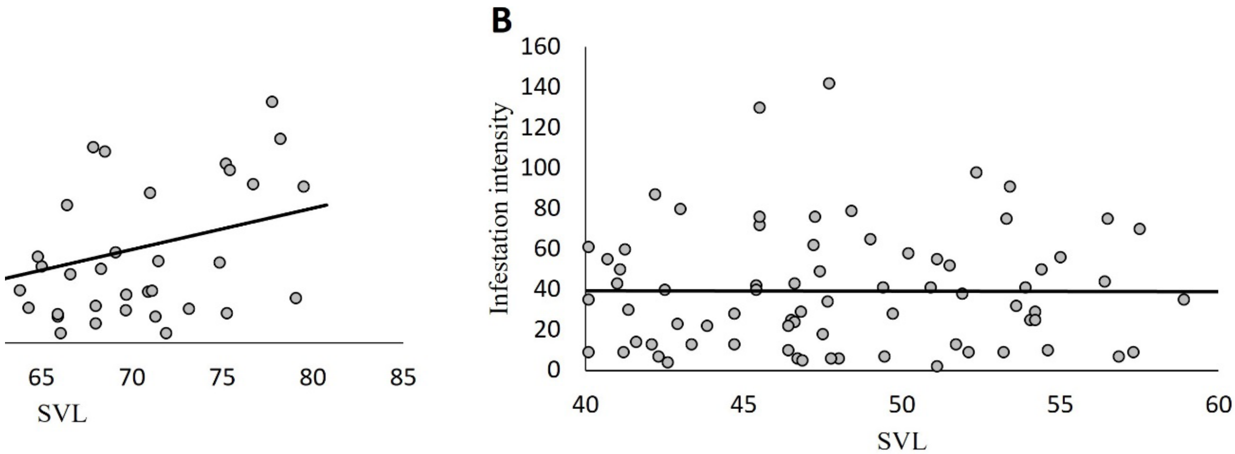

Fig. 4. *Eutrombicula alfreddugesi* infestation intensity correlation related to snout-vent length (SVL) of *Tropidurus hygomi* according to lifestage: Adults (A) and juveniles (B), from September 2020 to August 2021 in Condomínio Busca Vida, Bahia state, Brazil northeastern.

for both life stages and sexes. This can be explained by *E. alfreddugesi* larvae actively searching for ideal microhabitats on the lizard body (Carvalho et al., 2006; Rocha et al., 2008), with mite pockets offering these small ectoparasites thermal, hydric, and mechanical protection (Cunha-Barros et al., 2003; García-de la Peña et al., 2004).

Considering the significant differences in *E. alfreddugesi* infestation according to *T. hygomi* life stages, this condition may reflect a set of morphological and behavioral host traits that undergo ontogenetic changes. Some authors have argued that younger individuals tend to have lower infestation rates than adult individuals do because they are less exposed to mites (Aho, 1990; Fontes et al., 2003) (Menezes et al., 2011). However, we discarded this idea because mites remain attached to their hosts for a relatively short time, generally 3–5 days (Rocha et al., 2020; Shatrov, 2000). Although mite prevalence and infestation intensity in *T. hygomi* increased proportionally with host age, we believe that this reflects the larger area available for colonization by mites in hosts with a larger body size (a consequence of age), as has been reported for other *Tropidurus* species (Carvalho et al., 2006; Cunha-Barros & Rocha, 2000).

In the present study, despite significant differences recorded, MRPP analysis displayed fairly close conditions in infestation in *T. hygomi* (Carvalho et al., 2006), with *T. hygomi* males presenting a slightly higher prevalence than that in females. Infestation intensity studies that observed no difference in infestation between the sexes attributed this to the low specificity for the natural host of the mites (Fajfer, 2012; Zhan et al., 2013). Therefore, females and males of *T. hygomi* could display sexual dimorphism after sexual maturity, with males providing more space on the body for mites (Luque et al., 2005; (Poulin, 2013). However, ecological traits such as foraging habits, diet, and microhabitat differences seem to be similar for both females and males (Martins et al., 2010; Travassos et al., 2015; Vargens et al., 2008).

Significant differences in infestation between the dry and wet seasons also underscore the important role of climatic and environmental factors in the host–parasite dynamic, which can be explained by biological and ecological changes (Clopton & Gold, 1993; Klukowski, 2004; Shaw & Dobson, 1995). In the present study, we reported the incidence of mites at milder temperatures, which was more pronounced during the dry season, indicating decisive climatic factors under the *E. alfreddugesi* life cycle. This could be explained by the fact that mites avoid extreme temperatures and become undetectable under hot and dry conditions (Clopton & Gold, 1993). In addition, mites display a higher incidence under a combination of mild temperatures and moderate humidity, as excess humidity prevents the hatching of trombiculid eggs, thereby reducing their abundance in the environment (Klukowski, 2004; Sasa, 1961).

Considering ecological aspects, the results of the present study allow us to focus on a relatively under-investigated aspect of the interaction between mites and lizards, which displays a new behavior of these parasites in relation to the secondary sexual characteristics of the hosts. Our results support the following hypotheses: (1) females can select males for their ability to withstand greater parasitic intensities (Hamilton & Zuk, 1982), and (2) coloration patterns might be related to the levels of harbored parasites and be a sexual selection trait in lizards (Martín et al., 2008; Martín & López, 2009). However, a series of specific experiments are necessary for this to be confirmed. Therefore, we emphasize the need to undertake specialized experimental studies on the involvement of mites in the sexual selection mechanisms of *T. hygomi* and other host lizards.

The *E. alfreddugesi* infestation patterns in *T. hygomi* presented here appear to be caused by seasonal, sexual, and ontogenetic variabilities in different proportions, with mite pockets playing an important role. Their morphological formation may explain many of the observed patterns. In summary, the highest infestation intensities occurred at milder temperatures and were more pronounced in adult males, mainly owing to their morphological characteristics. This lack of harm to the host body suggests a balanced relationship between mites and lizards. Proximate answers to the common, prevalent, and intense relationship between mites and *Tropidurus* might be the morphological, biological, and ecological factors that bring them together, suggesting an evolutionary convergence between the parasite and host.

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