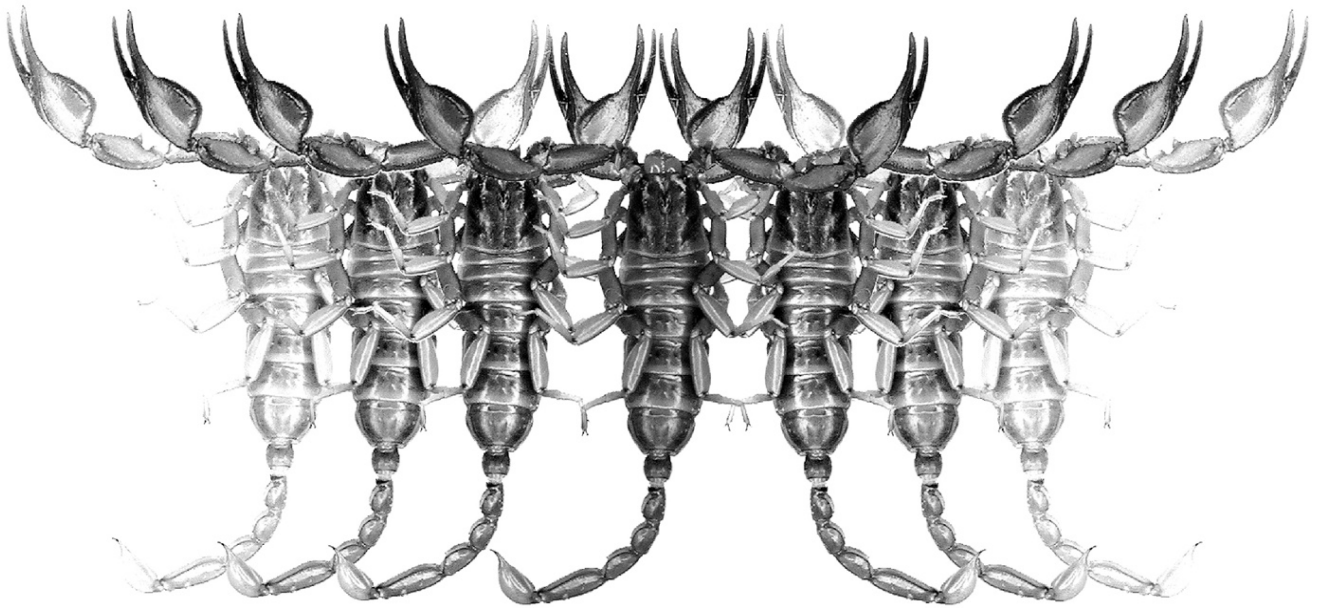


# ***Euscorpius***

**Occasional Publications in Scorpiology**



## **Scorpion predation in Cuba: new cases and a review**

**Tomás M. Rodríguez-Cabrera, Rolando Teruel & Ernesto Morell Savall**

**April 2020 — No. 306**

# *Euscorpius*

## *Occasional Publications in Scorpiology*

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# Scorpion predation in Cuba: new cases and a review

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## Summary

The ecology of Cuban scorpions is very insufficiently studied and the scarce existing information on their natural enemies is dispersed in the literature. However, scorpions in general are well known to play an important role both as predators and prey in natural ecosystems. Herein we present new instances of predation on different species of scorpions in Cuba, and a review on the topic.

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## Introduction

Scorpions in general have effective defensive mechanisms due to their sting and venom (e. g., Polis, 1990). However, a variety of invertebrates and vertebrates have found the way to evade such defenses in order to use scorpions as food (see reviews in Polis et al., 1981; Mc Cormick & Polis, 1990; Dupré, 2008). Intraspecific predation (cannibalism) is also very frequent in either one of two forms: 1) mate or sexual cannibalism (usually a larger female eats a smaller male during or after courtship), and 2) “ecological cannibalism” (in many scorpion populations, cannibalism represents a major cause of mortality and hence acts as an intrinsic density-dependent regulator of population size; Polis & Farley, 1979, 1980; Polis 1980, 1981; Peretti et al., 1999).

In Cuba, a long-term study on the ecology of any scorpion species that shows a list of confirmed natural predators does not exist. The available information on this subject is scarce and dispersed (see the complete list of references in Table 1). Armas (2014) also mentioned some domestic animals such as dogs, cats and chicken that occasionally kill scorpions in Cuba, but only the last one has been confirmed as predator. The aim of this work is to report 368 new instances of predation involving Cuban scorpions from various localities all over the main island (Fig. 1). At the same time, we compile a review of all predators reported for this arachnid group in Cuba.

In order to include in our analysis those cases where scorpions were just listed among the confirmed prey of a certain species, without quantitative data (e. g., Sampedro et al., 1979; Abréu et al, 1988; L. R. Hernández López in Armas et al., 2000; C. Wotzkow in Armas et al., 2000), we assume each mention as representing at least one independent predation event. Datum for all geographic coordinates is WGS 84.

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## Result

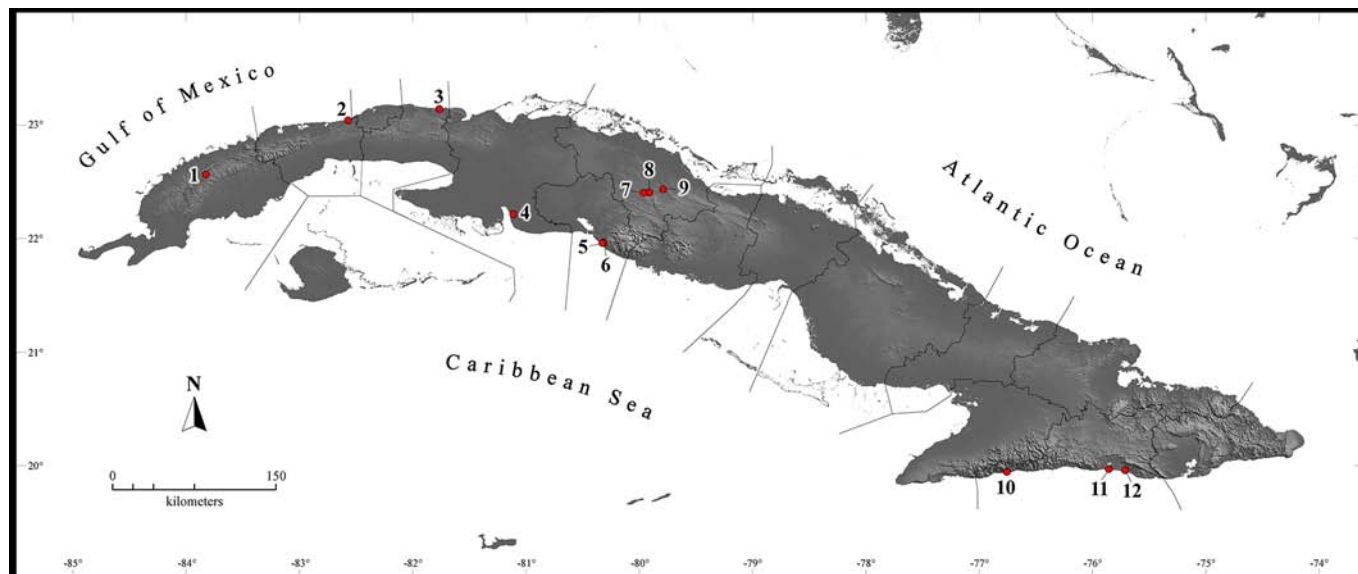
### *Intraspecific predation*

Between 14-15 June 2006, two instances of cannibalism in *Centruroides anchorellus* Armas, 1976, were observed at “La Mula” camping site (19°56'50.2"N 76°45'34.0"W; 1 m a. s. l.), Guamá, Santiago de Cuba Province. One case involved an adult male and the other one an adult female, both preying upon sub-adult conspecifics. The scorpions were found by day under tree barks of *Coccoloba uvifera* Linné and *Morinda citrifolia* Linné, on sandy soil about 50 m from the shoreline.

Between 2008 and 2019, about 300 different instances of cannibalism in *Heteroctenus junceus* (Herbst, 1800) were observed during a long-term scorpion population survey in the vicinity of Santa Clara city (central point: 22°24'26.3"N 79°57'55.5"W; between 50-150 m a. s. l.), Santa Clara, Villa Clara Province. The scorpions involved included mostly adult specimens preying upon smaller immature conspecifics or even prey of almost the same size. They were found always active at night on rocks or on the ground in secondary shrubby vegetation on serpentine soil.

On 28 June 2014, a subadult *H. junceus* was found preying upon a smaller immature conspecific at Canasí (23°08'42.2"N 81°46'23.6"W; 2 m a. s. l.), Santa Cruz del Norte, Mayabeque Province (Fig. 2a). The scorpions were observed active at night on a *Coccoloba* tree root close to the ground level and about 30 m from the shoreline.

On 8 January 2015, an adult female *C. gracilis* (Latreille, 1804) was found preying upon an immature conspecific at Playa Baracoa (23°02'42.0"N 82°34'34.8"W; 1 m a. s. l.), Caimito, Artemisa Province (Fig. 2b). The scorpions were observed at daytime under a pile of debris in secondary vegetation about 100 m from the shoreline.



**Figure 1.** Map of Cuba depicting the locations where the new cases of predation on scorpions presented in this work were observed: 1) “Maravillas de Viñales” trail, 2) Playa Baracoa, 3) Canasí, 4) Los Hondones, 5) Boca Ambuila, 6) road to Boca Ambuila, 7) Santa Clara city and vicinity, 8) headquarters of the “Empresa Nacional para la Protección de la Flora y la Fauna”, 9) near Minerva dam, 10) La Mula camping site, 11) La Estrella canyon, and 12) facilities of the biological station at “Siboney-Jutici” Ecological Reserve.

Predator	Prey	n	Source
<b>ARTHROPODA</b>			
<b>INSECTA</b>			
Hymenoptera: Formicidae			
<i>Solenopsis geminata</i>	<i>Heteroctenus junceus</i> <sup>1</sup>	1	Teruel & Armas (2012)
<b>ARACHNIDA</b>			
Araneae: Pholcidae			
<i>Ciboneya nuriae</i>	<i>Tityopsis sheylae</i>	1	Teruel & Rodríguez-Cabrera (2020)
Araneae: Theridiidae			
<i>Latrodectus mactans</i>	<i>Heteroctenus junceus</i> <sup>1</sup>	2	Teruel (1996, 1997), Teruel & Armas (2012)
Araneae: Caponiidae			
<i>Nops guanabacoae</i>	<i>Heteroctenus junceus</i> <sup>1</sup>	1	Teruel & Sánchez (2000)
Araneae: Theraphosidae			
<i>Phormictopus auratus</i>	<i>Heteroctenus junceus</i> <sup>1</sup>	3	Teruel & Armas (2012)
Araneae: Indeterminate	<i>Tityopsis sheylae</i>	1	Teruel & Rodríguez-Cabrera (2020)
Scorpiones: Buthidae			
<i>Alayotityus delacruzii</i>	<i>Alayotityus delacruzii</i>	1	Teruel (1997)
<i>Alayotityus nanus</i>	<i>Microtityus</i> cf. <i>trinitensis</i>	1	Teruel (1996)
<i>Centruroides anchorellus</i>	<i>Centruroides anchorellus</i>	3	Teruel (1996), this paper
<i>Centruroides arctimanus</i>	<i>Centruroides arctimanus</i>	1	Teruel (1997)
<i>Centruroides baracoae</i>	<i>Centruroides baracoae</i>	1	Teruel & Kovařík (2012)
<i>Centruroides gracilis</i>	<i>Centruroides gracilis</i>	4	Teruel (1997), this paper
<i>Heteroctenus junceus</i> <sup>2</sup>	<i>Heteroctenus junceus</i>	303	Armas in Teruel (1997) <sup>1</sup> , Teruel (1997) <sup>1</sup> , this paper
	<i>Cazierius gundlachii</i>	2	Teruel (1997), Teruel & Armas (2012), this paper
	<i>Centruroides guanensis</i>	1	This paper
	<i>Centruroides stockwelli</i>	1	This paper
	<i>Didymocentrus sanfelipensis</i>	1	This paper
<i>Microtityus fundorai</i>	<i>Microtityus fundorai</i>	1	Teruel (1997)
Scorpiones: Scorpionidae			
<i>Cazierius gundlachii</i>	<i>Cazierius gundlachii</i>	2	Teruel (1997)
Amblypygi: Phryniidae			
<i>Paraphrynus cubensis</i>	<i>Centruroides gracilis</i>	1	Forcelledo & Armas (2014)

Predator CHORDATA (VERTEBRATA)	Prey	n	Source
<b>AMPHIBIA</b>			
Anura: Bufonidae			
<i>Peltophryne fustiger</i>	<i>Heteroctenus junceus</i>	16	Armas (1987) <sup>1</sup> , this paper
<i>Peltophryne peltoccephala</i>	<i>Heteroctenus junceus</i>	41	This paper
<i>Peltophryne taladai</i>	<i>Centruroides baracoae</i> <sup>2</sup>	1	Fong & Garcés (2002)
Anura: Hylidae			
<i>Osteopilus septentrionalis</i>	<i>Centruroides guanensis</i>	1	Teruel (1996)
	<i>Centruroides gracilis</i>	1	Armas (2014)
<b>REPTILIA</b>			
Squamata: Dactyloidae			
<i>Anolis equestris</i>	<i>Heteroctenus junceus</i>	1	This paper
<i>Anolis homolechis</i>	<i>Cazierius gundlachii</i>	1	This paper
<i>Anolis porcatus</i>	<i>Centruroides baracoae</i> <sup>2</sup>	1	Armas et al. (2000)
<i>Anolis sagrei</i>	<i>Cazierius gundlachii</i>	1	Teruel (1997)
	<i>Heteroctenus junceus</i>	1	This paper
Squamata: Leiocephalidae			
<i>Leiocephalus macropus</i>	Indeterminate	1	Sampedro et al. (1979)
<i>Leiocephalus raviceps</i>	Indeterminate	1	Sampedro et al. (1979)
<b>AVES</b>			
Cuculiformes: Cuculidae			
<i>Coccyzus merlini</i>	Indeterminate	2	Hernández López in Armas et al. (2000), Teruel & Sánchez (2004)
Passeriformes: Mimidae			
<i>Mimus polyglottos</i>	<i>Heteroctenus junceus</i>	1	This paper
Strigiformes: Strigidae			
<i>Athene cunicularia</i>	Indeterminate	5*	Regalado (1975)
<i>Glaucidium siju</i>	Indeterminate	1	Wotzkow in Armas et al. (2000)
<b>MAMMALIA</b>			
Soricomorpha: Solenodontidae			
<i>Solenodon cubanus</i>	<i>Centruroides baracoae</i> <sup>2</sup>	2	Armas (1987), Abréu et al (1988)
	<i>Heteroctenus junceus</i> <sup>1</sup>	1	Abréu et al (1988)
<b>TOTAL</b>		<b>411</b>	

**Table 1.** Summary of confirmed predators of Cuban scorpions, from the literature and this paper. In the case of the burrowing owl, *Athene cunicularia* (\*), Regalado (1975) listed three and five claws found in five stomach contents and 12 pellets, respectively, but the author does not specify how many scorpion remains per stomach or pellet; therefore, we assume a minimum of five scorpions in total (two in stomach contents and three in pellets). <sup>1</sup> Referred as *Rhopalurus junceus*, <sup>2</sup> referred as *Centruroides anchorellus*.

### ***Intraguild predation (scorpions preying upon other scorpion species)***

On 28 June 2006, an adult male *H. junceus* was observed preying upon an adult male *Cazierius gundlachii* (Karsch, 1880) in the gardens surrounding the facilities of the biological station at “Siboney-Jutici” Ecological Reserve (19°57'39.0"N, 75°42'52.1"W; 35 m a. s. l.), Santiago de Cuba, Santiago de Cuba Province. The scorpions were found active at night on a small bush stem about 30 cm above the ground. Since *C. gundlachii* is strictly terrestrial, the predator must have captured it on the ground before climbing up to the vegetation carrying its prey.

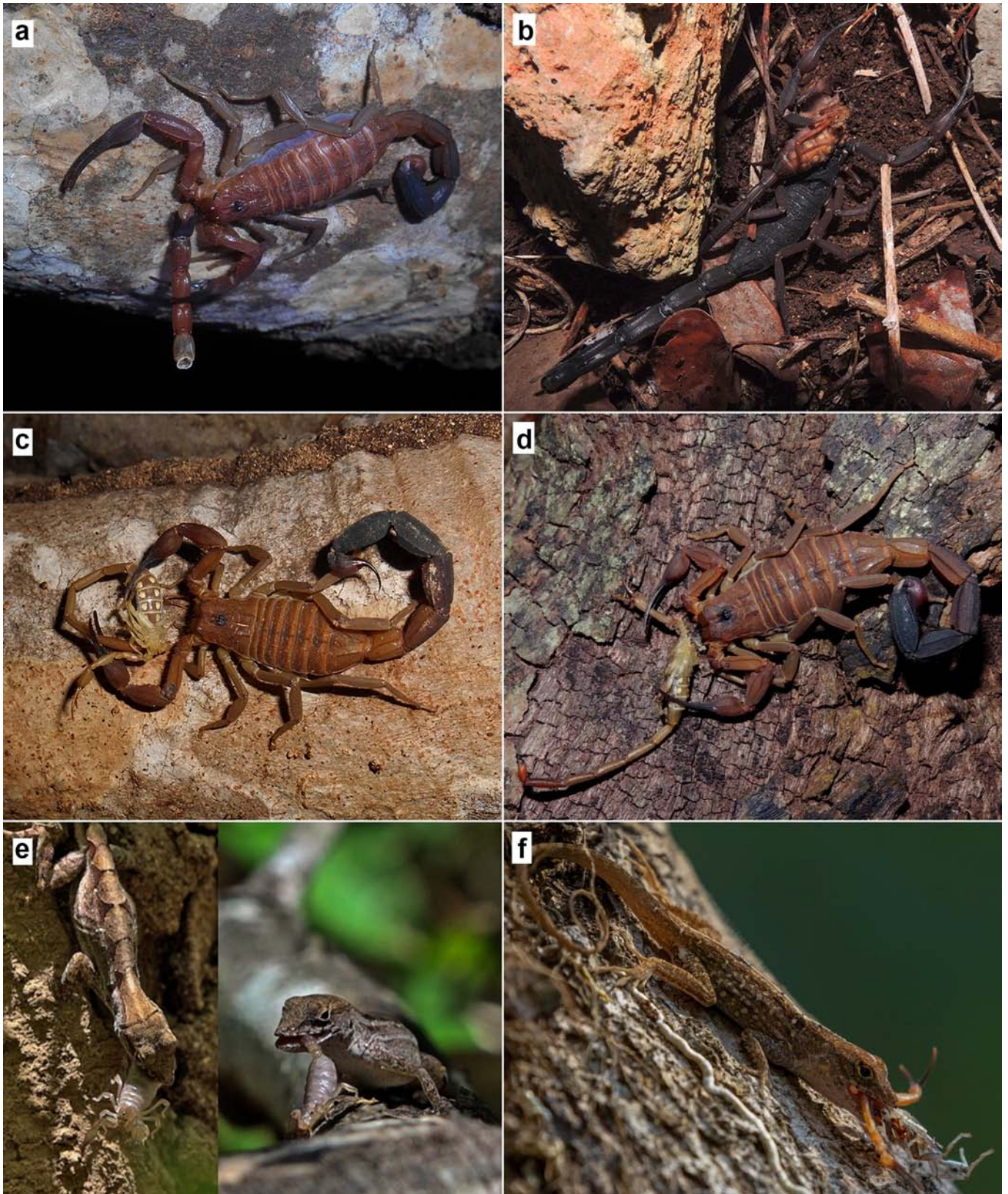
On 28 June 2014, an adult female *H. junceus* was observed preying upon an adult male *Centruroides guanensis* Franganillo, 1931, at Canasí (23°08'42.2"N 81°46'23.6"W;

2 m a. s. l.), Santa Cruz del Norte, Mayabeque Province (Fig. 2c). The scorpions were observed active at night on a *Coccoloba* tree trunk less than 1 m above the ground level and about 30 m from the shoreline.

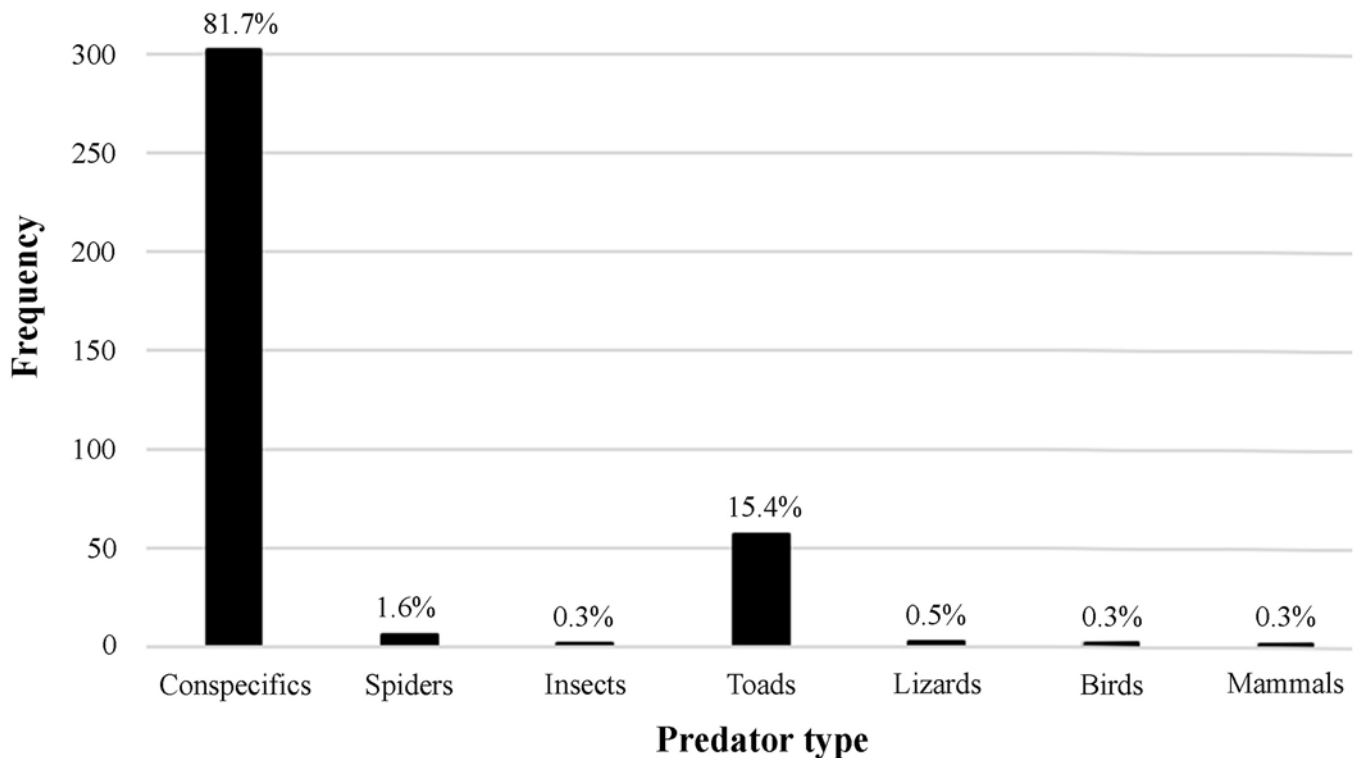
On 19 June 2015, an adult female *H. junceus* was observed preying upon an adult male *Centruroides stockwelli* Teruel, 2001, by the road to Boca Ambuila (21°57'47.5"N 80°19'30.9"W; 50 m a. s. l.), Cumanayagua, Cienfuegos Province (Fig. 2d). The scorpions were observed at night on a dead tree trunk in secondary vegetation.

On 13 November 2019, a subadult *H. junceus* was found preying upon an adult specimen *Didymocentrus sanfelipensis* Armas, 1976, near Minerva dam (22°26'03.3"N 79°47'40.2"W; 70 m a. s. l.), Santa Clara, Villa Clara Province. The scorpions were observed at night on the ground in secondary grassland with isolated bushes on serpentine soil.





**Figure 2.** *In situ* photographs of some of the predation events on Cuban scorpions reported in this work: a) sub-adult *Heteroctenus junceus* predated upon a smaller conspecific at Canasí, b) adult female *Centruroides gracilis* predated upon a smaller conspecific at Playa Baracoa, c) adult female *H. junceus* predated upon an adult male *C. guanensis* at Canasí, d) adult female *H. junceus* predated upon an adult male *C. stockwelli* by the road to Boca Ambuila, e) adult female *Anolis homolechis* predated upon an immature *Cazierius gundlachii* at La Estrella canyon, and f) an adult male *Anolis sagrei* predated upon an immature *H. junceus* at Los Hondones. Photographs by Sheyla Yong (a, c), T.M. Rodríguez-Cabrera (b, d), R. Teruel (e), and Aliesky del Río (f).



**Figure 3.** Frequency of predation upon *Heteroctenus junceus* (N=371) by the different predator groups, from the literature and this work. Notice the high incidence of predation by conspecifics and toads (*Peltophryne* spp.).

### Predation by vertebrates

Between 2008 and 2019, remains of *H. junceus* were found in 39 different feces of the toad *Peltophryne peltoccephala* (Tschudi, 1838) during a long-term scorpion population survey in the vicinity of Santa Clara city (central point: 22°24'26.3"N 79°57'55.5"W; between 50-150 m a. s. l.), Santa Clara, Villa Clara Province. The remains were detected at night with the aid of UV light. The predominant vegetation in the area is secondary scrubland on serpentine soil.

Similar to the cases related above, remains of *H. junceus* were found in 15 different feces of the toad *Peltophryne fustiger* Schwartz, 1960, during two independent night-collecting events with UV light at “Maravillas de Viñales” trail (22°33'49"N 83°50'01"W; between 180-200 m a. s. l.), Viñales, Pinar del Río Province. The first finding occurred on April 24<sup>th</sup>, 2012 (12 feces) and the second on May 23<sup>rd</sup>, 2015 (three feces). The predominant vegetation in the area is semi-deciduous forest on limestone-karstic soil.

On August 18<sup>th</sup>, 2015, remains of *H. junceus* were found in the feces of a toad *P. peltoccephala* at Boca Ambuila (21°57'42.7"N 80°20'11.1"W; 20 m a. s. l.), Cumanayagua, Cienfuegos Province. The remains were detected at night with the aid of UV light. The predominant vegetation in the area is secondary grassland surrounded by semi-deciduous forest on limestone-karstic soil.

On January 15<sup>th</sup>, 2019, a toad *P. peltoccephala* was found predated upon an adult male *H. junceus* near Minerva dam (22°26'03.3"N 79°47'40.2"W; 70 m a. s. l.), Santa Clara, Villa Clara Province. When found at night, the toad had ingested most of the scorpion and only the metasoma remained visible hanging from its mouth, which was detected with the aid of UV light. They were on the ground in secondary grassland with isolated bushes on serpentine soil.

In March 2010, an adult specimen *Anolis equestris* Merrem, 1820, was observed preying upon an adult male *H. junceus* near the offices of the “Empresa Nacional para la Protección de la Flora y la Fauna” (22°24'13.3"N 79°55'05.5"W; 100 m a. s. l.), Santa Clara, Villa Clara Province. The predation event was observed by day after the rock hiding the scorpion was turned over. The scorpion started to climb up on a tree trunk while running away and when it was about 60 cm above the ground, the anole jumped from a neighbor tree and captured it. The predominant vegetation in the area is composed mostly by secondary groves and bushes on serpentine soil.

On March 11<sup>th</sup>, 2019, an adult female *Anolis homolechis* (Cope, 1864) was observed predated upon an immature *Cazierius gundlachi* (Karsch, 1880) at La Estrella canyon (19°58'15.0"N 75°51'33.0"W; 20 m a. s. l.), Santiago de Cuba Bay, Santiago de Cuba Province (Fig. 2e). At 1309 h, a rock was turned over, the scorpion suddenly ran away and the lizard (which was perching on a tree trunk nearby) immediately



jumped over it and climbed back on its perch, where finished to swallow it at 1323 h. The predominant vegetation in the area is semi-deciduous forest on limestone-karstic soil.

On February 20<sup>th</sup>, 2020, an adult male *A. sagrei* Cocteau in Duméril & Bibron, 1837, was observed preying upon an immature *H. junceus* at Los Hondones (22°13'04.0"N 81°07'07.0"W; 2.5 m a. s. l.) (Fig. 2f). The lizard was observed in the afternoon (1710 h) on limestone rocks holding the scorpion in its mouth. It seemed kind of dazed and with agitated breathing, presumably because of the scorpion venom effects. Finally, it jumped onto a tree trunk and climbed up taking its prey out of sight.

In 2009, a bunch of juveniles' instar II *H. junceus* was released near the offices of the "Empresa Nacional para la Protección de la Flora y la Fauna" (22°24'13.3"N 79°55'05.5"W; 100 m a. s. l.), Santa Clara, Villa Clara Province. Shortly after the scorpions were released a bird *Mimus polyglottos* Linné, 1758, perching on the nearby bushes flew toward the place and started to chase them. At least one juvenile *H. junceus* was observed being consumed by the bird.

Scorpions (78.3%), including conspecifics, and toads (14%) are by far the most important scorpion predators in Cuba according to the available data (N=411; Table 1). These results match those reported previously for Cuba (for a summary of references see Table 1), as well as other regions of the world (see reviews in Polis et al., 1981; Mc Cormick & Polis, 1990; Dupré, 2008). In the case of *H. junceus*, one of the most common scorpion species in Cuba (e.g., Teruel, 1997; Teruel & Armas, 2012) and the one with the largest sample size in our study (N=371, 90.3% of all predation events), intraspecific predation represented 81.7% of all cases and toads 15.4%; only a small proportion (3%) was represented by other animals such as insects, spiders, lizards, and birds (Fig. 3).

As occurs with other scorpion species from continental areas (e.g., Polis & Farley, 1980; Polis, 1980, 1981), cannibalism certainly represents a major cause of mortality at least in *H. junceus* populations. Nonetheless, further long-term studies are needed in order to analyze the extent to which intraspecific predation function as a regulator of population size in this and other Cuban scorpion species.

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## References

- ABRÉU, R. M., J. DE LA CRUZ & A. RAMS. 1988. Algunos datos sobre la alimentación del almiquí (*Solenodon cubanos*; Insectivora: Solenodontidae) en vida libre. *Garciana*, 10: 2–3.
- ARMAS, L. F. DE. 1987. Depredación de arácnidos por dos vertebrados cubanos. *Miscelánea Zoológica*, 34: 1–2.
- ARMAS, L. F. DE. 2014. Depredación de *Centruroides gracilis* (Latreille, 1804) (Scorpiones: Buthidae) por *Osteopilus septentrionalis* Duméril & Bibron, 1841 (Anura: Hylidae). *Revista Ibérica de Aracnología*, 24: 125–126.
- ARMAS, L. F. DE, A. FONG & F. RODRÍGUEZ. 2000. Depredación del alacrán *Centruroides anchorellus* (Scorpiones: Buthidae) por la lagartija *Anolis porcatus* (Iguania: Polychridae). *Cocuyo*, 9: 14.
- DUPRÉ, G. 2008. Les prédateurs des scorpions (Arachnida: Scorpiones). *Arachnides - Bulletin de Terrariophile et de Recherche*, 54: 9–23.
- FONG, G., A. & G. GARCÉS G. 2002. *Bufo taladai* (NCN). Diet. *Herpetological Review* 33(4): 302.
- FORCELLEDO, L. J. & L. F. DE ARMAS. 2014. Depredación de *Centruroides gracilis* (Scorpiones: Buthidae) por *Paraphrynus cubensis* (Amblypygi: Phryniidae). *Revista Ibérica de Aracnología*, 25: 97–98
- MCCORMICK, S. J. & G. A. POLIS. 1990. Prey, predators, and parasites. Pp. 294–320 in Polis, G. A. (ed.), *The Biology of Scorpions*. Stanford, California: Stanford University Press.
- PERETTI, A. V., L. E. ACOSTA & T. G. BENTON. 1999. Sexual cannibalism in scorpions: fact or fiction? *Biological Journal of the Linnean Society*, 68: 485–496.
- POLIS, G. A. 1980. The effect of cannibalism on the demography and activity of a natural population of desert scorpions. *Behavioral Ecology and Sociobiology*, 7: 25–35.
- POLIS, G. A. 1981. The evolution and dynamics of intraspecific predation. *Annual Review of Ecology and Systematics*, 12: 225–251.
- POLIS, G. A. (ed.) 1990. *The Biology of Scorpions*. Stanford, California: Stanford University Press, 587 pp.
- POLIS, G. A. & R. D. FARLEY. 1979. Behavior and ecology of mating in the cannibalistic scorpion, *Paruroctonus mesaensis* Stahnke (Scorpionida: Vaejovidae). *The Journal of Arachnology*, 7: 33–46.



- POLIS, G. A. & R. D. FARLEY. 1980. Population biology of a desert scorpion: survivorship, microhabitat, and the evolution of life history strategy. *Ecology*, 61(3): 620–629.
- POLIS G. A., W. D. SISSOM & S. J. MCCORMICK. 1981. Predators of scorpions: field data and a review. *Journal of Arid Environments*, 4(4): 309–326.
- REGALADO, P. 1975. Primer hallazgo de *Speotyto cunicularia* (Molina) anidando en Cuba. *Revista Forestal Baracoa, Cuba; Publicación Científico-Técnica Año 5*, 1-2: 36–56.
- SAMPEDRO MARÍN, A., V. BEROVIDES ÁLVAREZ & O. TORRES FUNDORA. 1979. Hábitat, alimentación y actividad de dos especies de *Leiocephalus* (Sauria: Iguanidae) en dos localidades de la región suroriental de Cuba. *Ciencias Biológicas*, 3: 129–139.
- TERUEL, R. 1996. Enemigos naturales de los escorpiones cubanos. I. *Garciana*, 24-25: 13–14.
- TERUEL, R. 1997. *El orden Scorpiones en el tramo Cabo Cruz-Punta de Maisí, Cuba (Arthropoda: Arachnida)*. B.Sc. dissertation (unpublished), Universidad de Oriente, Santiago de Cuba, 55 pp.
- TERUEL, R. & L. F. DE ARMAS. 2012. Redescipción de *Rhopalurus junceus* (Herbst, 1800) (Scorpiones: Buthidae). *Boletín de la Sociedad Entomológica Aragonesa*, 50: 153-174.
- TERUEL, R. & F. KOVAŘÍK. 2012. *Scorpions of Cuba*. Prague: Clairon Productions, 232 pp.
- TERUEL, R. & T. M. RODRÍGUEZ-CABRERA. 2020. Revision of the genus *Tityopsis* Armas, 1974 (Scorpiones: Buthidae). Part 1. General updates and description of four new species. *Euscorpius*, 304: 1–40.
- TERUEL, R. & A. J. SÁNCHEZ. 2000. Nota sobre la depredación de un escorpión (Scorpiones: Buthidae) por una araña (Araneae: Caponiidae). *Biodiversidad de Cuba Oriental*, Vol. IV: 82–83.
- TERUEL, R. & A. J. SÁNCHEZ. 2004. Depredación del escorpión *Centruroides griseus* (C. L. Koch 1844) (Arachnida: Scorpiones: Buthidae) por el cuco *Saurothera vieilloti* (Bonaparte 1850) (Aves: Cuculiformes: Cuculidae). *Revista Ibérica de Aracnología*, 9: 285–286.