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Available evidence on worm lizard (Amphisbaenia) density from systematic surveys and opportunistic records

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Resumo

O estilo de vida subterrâneo das anfisbenas impõe restrições à amostragem ecológica, resultando em estimativas de densidade populacional escassas e metodologicamente heterogêneas. Revisamos a literatura disponível que relata dados sobre a densidade de anfisbenas. Apenas um número limitado de estudos apresenta estimativas de densidade baseadas em áreas amostradas claramente definidas, concentradas sobretudo no sul da África e geralmente expressas em metros quadrados. Os valores reportados refletem diferenças de metodologia, profundidade de escavação, adequabilidade do habitat e escala espacial, e não uma variação biológica real. Evidências adicionais, provenientes de escavações não sistemáticas e amostragens de superfície, sugerem que as anfisbenas podem atingir alta abundância local onde há habitat subterrâneo adequado, embora tais dados não possam ser convertidos em estimativas confiáveis de densidade. Estimativas derivadas de aragem agrícola ou de atividades de terraplenagem associadas ao licenciamento ambiental, embora costumem se basear em muitos espécimes, frequentemente resultam em densidades aparentes mais baixas, provavelmente em função da detecção incompleta e da inclusão de áreas com habitat inadequado. A adoção de padrões mais rigorosos de registro e a publicação criteriosa de dados oportunísticos poderiam avançar substancialmente o conhecimento sobre a história natural das anfisbenas.

Palavras-chave

anfisbenas, biodiversidade, densidade, ecologia, história natural

Abstract

The subterranean lifestyle of amphisbaenians limits ecological sampling, leading to sparse, methodologically heterogeneous estimates of population density. We reviewed available literature reporting on amphisbaenian density. Only a limited number of studies provide density estimates based on clearly defined sampled areas, mostly from southern Africa and typically expressed at the scale of square meters. Reported values reflect differences in methodology, excavation depth, habitat suitability, and spatial scale rather than true biological variation. Additional evidence from non-systematic excavation and surface sampling suggests that amphisbaenians may reach high local abundance where suitable subterranean habitat is available, although such data cannot be reliably converted into density estimates. Estimates derived from agricultural plowing or bulldozing, as part of environmental licensing, although usually based on several specimens, often yield lower apparent densities, likely due to incomplete detection and the inclusion of unsuitable habitat. Improved reporting standards and the careful publication of opportunistic data could substantially advance knowledge of amphisbaenian natural history.

Keywords

amphisbaenians, biodiversity, density, ecology, natural history

Reptiles constitute the species-richest group of current terrestrial vertebrate taxa, with more than 12,650 recognized species (Uetz et al., 2026). More than 2,500 reptile species are fossorial, including all 200 species of worm lizards (Amphisbaenia) (Measey, 2006; Uetz et al., 2026). Worm lizards (or amphisbaenians) are limbless and elongated lizards, distributed in the Middle East, Anatolia, the Iberian Peninsula, Africa, South America, the Caribbean, parts of Mexico, and Florida (Costa & Garcia, 2019).

The subterranean lifestyle of amphisbaenians poses substantial challenges to their detection and sampling. Not surprisingly, many species are known from only one or very few specimens (Meiri et al., 2018). They are often captured only sporadically, especially after heavy rains (Gans, 1969; Broadley et al., 1976), and some species remain undetected for long periods between their descriptions and eventual rediscovery (Branch et al., 2003, 2018; Santos, 2013).

Standard herpetological methods, such as pitfall and funnel traps, are often ineffective for capturing amphisbaenians (Ribeiro-Júnior et al., 2008, 2011; Jordaan et al., 2025a), as these traps require surface activity to prove effective (Jordaan et al., 2025a). A method involving termite mound removal may increase detection rates in some contexts, but is labor-intensive and rarely feasible at large scales (Pramuk & Alamillo, 2003; Moreira et al., 2009). Active searching through soil excavation using shovels or hoes has proven effective and relatively inexpensive in certain situations, although it remains underutilized (e.g., Measey, 2006; Gomes et al., 2009; Jordaan et al., 2023a). In some regions, amphisbaenians can also be easily found beneath rocks, where they may bask or forage (Martín et al., 2011; Balestrin & Cappellari, 2011). In addition, specimens are frequently encountered opportunistically after soil disturbance caused by agricultural plowing, bulldozing during environmental licensing activities (Broadley et al., 1976; Zamprogno & Sazima, 1993; Ribeiro et al., 2020), or dam filling (Vanzolini, 1996; Castro-Mello, 2000).

Sampling difficulties have limited ecological studies of amphisbaenians, leaving major gaps in knowledge about their biology. One of the least understood aspects concerns their population densities in natural environments. Here, we compile and contextualize published records that, explicitly or implicitly, report estimates of amphisbaenian density. Our objective is not to establish reliable density values, but to document how rarely such information has been reported, under which circumstances it has been obtained, and what limitations constrain its interpretation.

We searched scientific literature for records reporting estimates of population density of any species of Amphisbaenia. Our survey included the original descriptions and redescriptions of all amphisbaenian species, compiled from Gans (2005) and Uetz et al. (2026), as well as more than 200 studies on the ecology and natural history of amphisbaenians that we have gathered over a decade. These sources were obtained from journals such as *African Herp News*, *Herpetology Notes*, *Herpetological Review*, *Herpetological Conservation and Biology*, and *Herpetologia Brasileira*, in addition to Google Scholar alerts using the keyword "Amphisbaen*", which are received weekly by the first author via email. We considered studies that provided any numerical information potentially related to population density, even when systematic sampling designs were not employed. These range from ecological studies reporting density estimates based on systematically excavated quadrats to taxonomic works or natural history notes citing the number of individuals of any species per unit area (m^2 or ha), usually recorded after bulldozer activity. When references cited additional sources containing density-related information, these were also consulted.

Available density estimates and methodological heterogeneity

We identified only 15 published studies with information that can be interpreted as density estimates for 10 amphisbaenian species, with four studies from South America and 11 from Africa (Table 1). Most African studies report density based on excavated quadrats, expressing results as individuals per square meter (ind./m^2),

which directly reflects the sampled area. In contrast, most South American estimates derive from specimens unearthed during mechanical soil disturbance (e.g., bulldozers or agricultural plowing) and are commonly expressed as individuals per hectare (ind./ha). In such cases, hectare-based values represent extrapolations that implicitly assume spatial homogeneity and that the entire disturbed area constitutes suitable subterranean habitat, assumptions that remain untested for most amphisbaenians. Thus, densities extrapolated to hectares may substantially overestimate true population density if large portions of the subsoil are unsuitable. Given the diversity of sampling designs, spatial scales, and detection probabilities, values should be interpreted at best as coarse indices of local density rather than as absolute population parameters.

The highest recorded density refers to *Zygaspis arenicola* Broadley & Broadley, 1997, a small species (maximum total length 213 mm) inhabiting sandy soils (Broadley & Broadley, 1997). Pooley et al. (1973) found nine individuals (cited as *Zygaspis violacea*) in only 10 m² of quadrats excavated to 75 cm depth in the uluKhondo Forest, South Africa (0.9 ind./m²; equivalent to 9,000 ind./ha if extrapolated). In the same study, densities of approximately 0.23 ind./m² were recorded in former cultivated fields at the forest edge, and 0.06 ind./m² on Ndumo Hill in open woodland. Measey et al. (2009) resampled some of these areas using shallower quadrats (25–30 cm) and recorded a 79% reduction in the density of underground herpetofauna species. In the uluKhondo forest, the density of *Z. arenicola* (cited by them as *Z. vandami*) declined to approximately 0.08 ind./m² (Measey et al., 2009). At Ndumo Hill, Measey (2006) recorded two individuals in 15 m² (0.13 ind./m²) in January 2004, but none between March 2004 and April 2005 (Measey et al., 2009).

Similar declines were recorded for other fossorial reptiles in the area. Although Measey et al. (2009) did not attribute these differences primarily to excavation depth, this factor cannot be ruled out. Morphological traits of *Z. arenicola*, such as its rounded head and pigmentation, suggest occupation of relatively shallow soil layers (Gans 1968), yet differences in quadrat depth, seasonal variation, and low detection probabilities complicate direct comparisons among studies. The decline in *Z. arenicola* density in the Ndumo Game Reserve was attributed to reductions in leaf litter caused by increased ungulate pressure, particularly from nyala antelope (*Tragelaphus angasii* Angas, 1849) (Measey et al., 2009). Subsequent surveys in this reserve (Jordaan et al., 2023b) recorded even lower densities (0.05 ind./m²), despite reduced ungulate pressure. Jordaan et al. (2023) suggest that recovery of fossorial herpetofauna may be slow or that methodological differences among studies limit direct comparisons.

Similar quadrat-based approaches in other South African reserves (Sileza Nature Reserve and Tshinini Game Reserve) revealed densities of *Z. arenicola* ranging from 0.02 to 0.20 ind./m² in excavated areas of 60–120 m² (Jordaan & Hanekom, 2019; Jordaan et al., 2023a). In contrast, in Sileza Nature Reserve, *Monopeltis sphenorhynchus* (Peters, 1879), a species with a shovel-shaped head and probable preference for deeper soil layers (Broadley et al., 1976), was recorded at much lower apparent densities (0.01–0.02 ind./m²) in quadrats 28–30 cm deep, although sample sizes were restricted to a single individual (Jordaan et al., 2023a). Finally, in Kruger National Park, Measey (2006) searched for *Z. vandami* (Fitzsimons, 1930) in a 15 m² sampling area (no further details provided) but found no specimens.

Additional evidence from non-systematic excavation and surface searches

Other studies using shovels or hoes to sample amphisbaenians suggest that these animals may reach relatively high local abundances, although such data were not included in Table 1 due to the lack of standardized sampling designs or clearly defined sampled areas. In Maranhão, northeastern Brazil, Gomes et al. (2009) non-systematically excavated soil from a 16-hectare riparian forest over five field expeditions lasting 3–15 days. During this effort, they collected 64 individuals of *Amphisbaena frontalis* Vanzolini, 1991 (then identified as *A. ibijara* Rodrigues et al., 2003, now a synonym

(Ribeiro-Júnior et al., 2022)) and 25 individuals of *Leposternon polystegum* (Duméril, 1851). Although the absence of a defined excavated area precludes reliable per-square-meter density estimates, the number of individuals recovered suggests that local abundance may be high where suitable subterranean habitat is available.

Similarly, over a seven-year period in a 200-hectare area (2 km^2) in Baja California, Mexico, Papenfuss (1982) recorded 2645 individuals of *Bipes biporus* Cope, 1894, with the assistance of local children. Again, because the precise area effectively searched or disturbed is unknown, these data cannot be converted into ind./m^2, but they clearly point to substantial local abundance over time.

In some regions, amphisbaenians can be found easily and in large numbers under rocks, particularly in southern Brazil (Balestrin & Cappellari, 2011) and in the Chafarinas archipelago off the African coast (Martín et al., 2011). Surveys conducted on the three islands that make up the Chafarinas (total area 54.6 ha) resulted in the encounter of more than 370 individuals of *Trogonophis wiegmanni* Kaup, 1830 (Martín et al., 2011), which can be roughly extrapolated as a density of approximately 7 ind./ha. However, Martín et al. (2011) standardized their surveys using 1-ha grid cells and distinguished between quadrats with suitable and unsuitable habitat across the islands, providing refined information on spatial occupancy (rare among studies of worm lizards) rather than estimating density. Consequently, the estimate of 7 ind./ha likely underestimates the density of *T. wiegmanni* within suitable habitat, as it averages records across areas that include extensive unsuitable substrate.

Density estimates derived from soil disturbance and mechanical excavation

In several cases, estimates of amphisbaenian density have been inferred from specimens unearthed after agricultural plowing or bulldozing associated with environmental licensing activities. Broadley et al. (1976) reported an estimated density of *Monopeltis capensis* Smith, 1848 of approximately 50 ind./ha (0.005 ind./m^2 if extrapolated) after plowing virgin soil to a depth of 20 cm in Odendaalsrus, South Africa. Even higher densities were reported for *Leposternon wuchereri* (Peters, 1879) in northeastern Brazil (205–240 ind./ha; 0.02 ind./m^2) after plowing 350 m^2 of soil (Zamprogno & Sazima, 1993). There are indications that amphisbaenian densities may decline over time due to continuous soil plowing or possibly the repeated use of chemical fertilizers, although direct evidence remains scarce (Broadley et al., 1976). Such disturbances may reduce habitat suitability by altering soil structure, compaction, or prey availability.

Amphisbaenians are also frequently encountered following bulldozer activity during road construction, power plant installation, or vegetation suppression. Some species have even been described based on specimens recovered under these circumstances (Porto et al., 2000; Costa et al., 2015; Ribeiro et al., 2019, 2020). Despite this, few studies provide quantitative estimates of amphisbaenian density following mechanical excavation (Table 1). In other cases, dozens or even more than 100 specimens are reported, but without information on the size of the disturbed area, preventing any estimate of density (Souza e Lima et al., 2014). When density estimates are available, they are generally lower than those derived from manual quadrat excavation, ranging from 0.000015 ind./m^2 (0.15 ind./ha) (Assis & Costa, 2020) to 0.0053 ind./m^2 (53 ind./ha) (Cabrera & Merlini, 1990). Several factors may contribute to this pattern, including: (i) genuinely lower densities of the sampled species; (ii) the inclusion of large proportions of unsuitable habitat in the excavated area, inflating the area denominator; and (iii) low detectability, as individuals may be buried beneath mounds of removed soil, may be rapidly preyed upon by birds before being recorded, and/or may remain buried underground (for example if excavation depth is shallow and most individuals are in deeper soil layers).

In two notable cases, bulldozer activity suggests comparatively high local densities. Broadley et al. (1976) reported 41 individuals of *Monopeltis capensis* recove-

red after mechanical excavation of 0.25 ha in the Lukosi River Bridge region, Zimbabwe, corresponding to 0.017 ind./m² (164 ind./ha if extrapolated). In Salvador, Brazil, Barros-Filho et al. (2013) reported 10 individuals of *Leposternon octostegum* (Duméril, 1841) unearthed in 0.015 ha, corresponding to 0.067 ind./m² (666 ind./ha if extrapolated). In contrast, Assis and Costa (2020) suggested a density of only 0.000015 ind./m² (0.15 ind./ha) for *L. octostegum* in an area dominated by an old *Pinus* plantation. Although this value may be substantially underestimated due to methodological limitations, it is also possible that local density was negatively affected by the long-term replacement of native vegetation.

Potential contribution of incidental records to amphisbaenian natural history

Increased industrial and infrastructure development has led to extensive excavation of soils and substrates using large machinery in countries where most amphisbaenian species occur. In Brazil alone, 291 new power plants were installed in 2023 (Rodrigues, 2024), representing only a fraction of the environmental licensing activities currently underway in the country. These operations inevitably result in the suppression of large areas of native vegetation and the exposure of the upper soil layers, during which dozens, hundreds, or potentially thousands of amphisbaenians may be unearthed. The use of bulldozers or other heavy machinery should not be regarded as a scientific sampling method, nor as a substitute for systematic ecological surveys. However, when amphisbaenians are incidentally exposed during legally mandated earth-moving activities, basic information such as the number of individuals observed and the approximate area disturbed can provide valuable opportunistic data on density at scales of square meters or hectares. At present, even when such records are collected, they rarely become accessible to the scientific community (Cabrera & Merlini, 1990; Zamprogno & Sazima, 1993; Barros-Filho et al., 2013; Assis & Costa, 2020).

In informal conversations, colleagues involved in environmental licensing in Brazil reported that numerous worm lizards are frequently recorded after bulldozer activity, but there is generally no concern about documenting the disturbed area or publishing even coarse density estimates. As a result, potentially informative observations on the natural history of these fossorial reptiles are either lost entirely or remain buried within grey literature and inaccessible archives.

Conclusions

Insufficient sampling and substantial gaps in natural history knowledge remain major impediments to reliable estimates of the density of fossorial herpetofauna (Measey, 2006). Despite these challenges, relatively low-cost methods such as manual excavation provide viable options for generating quantitative data, particularly when applied systematically (Measey, 2006; Measey et al., 2009; Jordaan & Hanekom, 2019; Jordaan et al., 2023a). Expanding these studies is important for collecting systematic data on amphisbaenian population density in different regions, particularly where the terrain and soil type are conducive to manual excavation (Jordaan et al., 2023a). Regions under strong anthropogenic pressure and with high amphisbaenian diversity, such as the Brazilian Cerrado and Caatinga, would benefit from targeted studies comparing densities across protected and disturbed areas.

While natural environments continue to be drastically altered, often in regions rarely visited by researchers, the opportunity to extract basic natural history information from amphisbaenians is wasted. This lack of knowledge is reflected in their conservation assessments: of the 186 species evaluated by the IUCN, 40 species (21.5%) are classified as Data Deficient (IUCN, 2025). If basic data from environmental licensing activities, such as the area of soil removed by bulldozing and the number of worm lizards found, were consistently recorded and eventually published, even as 'natural history notes', these activities could yield valuable information, though with biases and requiring careful examination. As biodiversity declines globally (Ceballos et al., 2015), addressing these gaps requires digging deeper to find knowledge.

Table 1. Published records providing proxies for amphisbaenian density under different sampling methods. Given differences in sampling methods, spatial scale, habitat suitability, and detection probability, values should be interpreted as context-dependent approximations or coarse indices of density rather than absolute population densities.

(1) Bulldozer and plowing tractors reflect opportunistic records with density extrapolated from mechanically disturbed areas; quadrat sampling by Pooley et al. (1973) was non-systematic.
(2) Seventy-two specimens collected by the authors, plus 10–12 specimens not collected but caught by birds.
(3) See main text for details.
(4) Originally cited as Zygaspis violacea violacea (Peters, 1854).

Species	Locality	Sampled area	N. specimens	Estimated density	Depth	Method[1]	Source
Amphisbaena heterozonata	ARGENTINA: Salta: Anta Department: *Finca San Javier*	1 ha	53	53 ind./ha	15 cm	Bulldozer	(Cabrera & Merlini, 1990)
Dalophia angolensis	ANGOLA: Moxico: Luena ['Between Vila Luso and Moxico, Calombe, 7 km. "west" of Vila Luso']	1 ha	19	19 ind./ha	15–20 cm	Bulldozer	(Gans, 1976)
Dalophia pistillum	ZIMBABWE: Matabeleland North District: *Dete* ['Dett crossroads, Wankie district']	5000 m^2	9	0.002 ind./m^2	2–3 cm	Bulldozer	(Broadley et al., 1976)
Leposternon octostegum	BRAZIL: Bahia: Salvador	150 m^2	10	0.07 ind./m^2	20–30 cm	Bulldozer	(Barros-Filho et al., 2013)
Leposternon octostegum	BRAZIL: Bahia: Mata de São João: *Fazenda Várzea de Baixo*	70 ha	11	0.15 ind./ha	30–50 cm	Bulldozer	(Assis & Costa, 2020)
Monopeltis capensis	ZIMBABWE: Matabeleland North District: Lukosi River bridge	2500 m^2	41	0.012 ind./m^2	40 cm	Bulldozer	(Broadley et al., 1976)
Leposternon wuchereri	BRAZIL: Bahia: Muruci	3500 m^2	72–84[2]	0.02 ind./m^2	20–40 cm	Plowing tractors	(Zamprogno & Sazima, 1993)
Monopeltis capensis	SOUTH AFRICA: Free State: Lejweleputswa: *Odendaalsrus*	1 ha	50	50 ind./ha	20 cm	Plowing tractors	(Broadley et al., 1976)
Trogonophis wiegmanni	Chafarinas archipelago	54.6 ha	370+	>7 ind./ha [3]	0 cm	Turning over stones	(Martín et al., 2011)
Monopeltis sphenorhynchus	SOUTH AFRICA: KwaZulu-Natal: uMkhanyakude: *Sileza Nature Reserve*	60 m^2	0	0 ind./m^2	27 cm	Quadrat sampling	(Jordaan et al., 2023a)
Monopeltis sphenorhynchus	SOUTH AFRICA: KwaZulu-Natal: uMkhanyakude: *Sileza Nature Reserve*	60 m^2	1	0.02 ind./m^2	30 cm	Quadrat sampling	(Jordaan et al., 2023a)
Monopeltis sphenorhynchus	SOUTH AFRICA: KwaZulu-Natal: uMkhanyakude: *Sileza Nature Reserve*	84 m^2	0	0 ind./m^2	27 cm	Quadrat sampling	(Jordaan et al., 2023a)
Monopeltis sphenorhynchus	SOUTH AFRICA: KwaZulu-Natal: uMkhanyakude: *Sileza Nature Reserve*	84 m^2	1	0.01 ind./m^2	28 cm	Quadrat sampling	(Jordaan et al., 2023a)

Species	Locality	Sampled area	N. specimens	Estimated density	Depth	Method(1)	Source
Monopeltis sphenorhynchus	SOUTH AFRICA: KWAZULU-NATAL: uMkhanyakude: *Tembe Elephant Park*	84 m²	2	0.024 ind./m²	30 cm	Quadrat sampling	(Jordaan et al., 2025b)
Zygaspis arenicola (4)	SOUTH AFRICA: KwaZulu-Natal: uMkhanyakude: *Ndumo Game Reserve*: *uluKhondo Forest*	10 m²	9	0.9 ind./m²	75 cm	Quadrat sampling	(Pooley et al., 1973)
Zygaspis arenicola	SOUTH AFRICA: KwaZulu-Natal: uMkhanyakude: *Ndumo Game Reserve*: *uluKhondo Forest*	60 m²	5	0.08 ind./m²	25 cm	Quadrat sampling	(Measey et al., 2009)
Zygaspis arenicola	SOUTH AFRICA: KwaZulu-Natal: uMkhanyakude: *Ndumo Game Reserve*: *uluKhondo Forest*	80 m²	4	0.05 ind./m²	25 cm	Quadrat sampling	(Jordaan et al., 2023b)
Zygaspis arenicola	SOUTH AFRICA: KwaZulu-Natal: uMkhanyakude: *Ndumo Game Reserve*: *Ndumu Hill*	15 m²	2	0.13 ind./m²	30 cm	Quadrat sampling	(Measey, 2006)
Zygaspis arenicola	SOUTH AFRICA: KwaZulu-Natal: uMkhanyakude: *Ndumo Game Reserve*: *Ndumu Hill*	60 m²	0	0 ind./m²	25 cm	Quadrat sampling	(Measey et al., 2009)
Zygaspis arenicola (4)	SOUTH AFRICA: KwaZulu-Natal: uMkhanyakude: *Ndumo Game Reserve*: *Ndumu Hill*	414 m²	25	0.06 ind./m²	75 cm	Quadrat sampling	(Pooley et al., 1973)
Zygaspis arenicola (4)	SOUTH AFRICA: KwaZulu-Natal: uMkhanyakude: *Ndumo Game Reserve*: *old cultivated fields bordering uluKhondo Forest*	13 m²	3	0.02 ind./m²	75 cm	Quadrat sampling	(Pooley et al., 1973)
Zygaspis arenicola	SOUTH AFRICA: KwaZulu-Natal: uMkhanyakude: *Sileza Nature Reserve*	60 m²	1	0.02 ind./m²	27 cm	Quadrat sampling	(Jordaan et al., 2023a)
Zygaspis arenicola	SOUTH AFRICA: KwaZulu-Natal: uMkhanyakude: *Sileza Nature Reserve*	60 m²	13	0.22 ind./m²	30 cm	Quadrat sampling	(Jordaan et al., 2023a)
Zygaspis arenicola	SOUTH AFRICA: KwaZulu-Natal: uMkhanyakude: *Sileza Nature Reserve*	84 m²	9	0.11 ind./m²	27 cm	Quadrat sampling (summer)	(Jordaan et al., 2023a)
Zygaspis arenicola	SOUTH AFRICA: KwaZulu-Natal: uMkhanyakude: *Sileza Nature Reserve*	84 m²	17	0.20 ind./m²	28 cm	Quadrat sampling (winter)	(Jordaan et al., 2023a)
Zygaspis arenicola	SOUTH AFRICA: KwaZulu-Natal: uMkhnyakude: *Tshinini Game Reserve*	60 m²	0	0 ind./m²	25 cm	Quadrat sampling (winter)	(Jordaan & Hanekom, 2019)
Zygaspis arenicola	SOUTH AFRICA: KwaZulu-Natal: uMkhnyakude: *Tshinini Game Reserve*	60 m²	2	0.03 ind./m²	25 cm	Quadrat sampling (summer)	(Jordaan & Hanekom, 2019)

Species	Locality	Sampled area	N. specimens	Estimated density	Depth	Method[1]	Source
Zygaspis arenicola	SOUTH AFRICA: KWAZULU-NATAL: uMkhanyakude: *Tembe Elephant Park*	84 m^2	2	0.024 ind./m^2	30 cm	Quadrat sampling	(Jordaan et al., 2025b)
Zygaspis arenicola	SOUTH AFRICA: KWAZULU-NATAL: Hluhluwe: Munywana Conservancy	24 m^2	3	0.012 ind./m^2	30 cm	Quadrat sampling	(Jordaan et al., 2025a)
Zygaspis vandami	SOUTH AFRICA: *Kruger National Park*	15 m^2	0	0 ind./m^2	30 cm	Quadrat sampling	(Measey, 2006)

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