Herpetology Notes, volume 13: 739-746 (2020) (published online on 25 August 2020)

How to source and collate natural history information: a case study of reported prey items of *Erythrolamprus miliaris* (Linnaeus, 1758)

Matthijs P. van den Burg[1,*]

Abstract. Knowledge about species' natural history, like observations of predator-prey interactions, helps us to understand the width of food webs and ecological niches. However, collating (un)published natural history information can be challenging, especially in this age of high scientific output, and especially so for geographically widespread and common species. Although an overview is lacking, incorrect data summaries and novelty statements in the literature are not uncommon. Here, I summarise the literature on prey items reported for *Erythrolamprus miliaris* (Linnaeus, 1758), a widespread South American dipsadid, and provide recommendations to collate natural history information. Overall, out of 52 unique taxonomic records, 44 unique prey species have been reported at the species level that mainly constituted Amphibia (n = 34; 77%); common prey in the semi-aquatic habitats where *E. miliaris* is mainly present. With reports from >20 different journals, as well as books, theses and conference papers, this overview demonstrates the need for authors to use a large range of sources when compiling species' natural history information. Provided recommendations allow authors to better collate a complete overview of reported natural history data and identify the potential novelty of field observations ahead of manuscript preparation and submission.

Keywords. Dietary overview**,** Information retrieval, Literature review, Prey diversity, South America, Systematic review

Introduction

Knowledge on natural history, such as predator-prey interactions, helps scientists to better understand the width of ecological niches as well as food webs. This holds especially true for common and widespread species that are generalist feeders given their broad range of food items. However, field observations that build our natural history knowledge are often collected opportunistically and incidentally, take time to accumulate, and are published or archived in widely-scattered literature, such that accessible summaries are still lacking for many species.

Commonly, reports of natural history events are published as single, case-by-case observations, in which authors briefly summarise published manuscripts and identify the novelty of their own work. Besides such brief summaries, other manuscripts collate these single-case manuscripts to address larger patterns, either at the species (Weiperth et al., 2014) or higher taxonomic level (Menin et al., 2005). However, the collation of natural history reports is not straightforward, as for example numerous journals are not indexed, and it is therefore not uncommon that provided summaries or overviews are incomplete, leading to incorrect novelty statements and conclusions, including both overlooked observations as well as over-estimation of prey evenness—a characteristic used to assess dietary specialisation (Alencar et al 2013)— because single observations of previously-reported prey items are unlikely to be published. For example, a statement by Carvalho et al. (2019) ("…reports of Leptodactylidae predation was limited only to one species, *L. latrans*") did not take into account data from Figueiredo-de-Andrade and Costa (2009), Hartmann et al. (2009) as well as Oda et al. (2009), and a statement by Lima Pereira et al. (2020) ("So far, no study involving *Lontra longicaudis* has reported lizards as predated or consumed by this species.") overlooked data from Mayor-Victoria and Botero-Botero (2009); other discrepancies are also reported by Sánchez-Hernández (2020). In light of the growing number of scientists, published manuscripts, as

[1] Department of Biogeography and Global Change, Museo Nacional de Ciencias Naturales, Consejo Superior de Investigaciones Científicas, C/ José Gutiérrez Abascal 2, 28006 Madrid, Spain.
[*] Corresponding author. E-mail: thijs.burg@gmail.com

well as journals, we need to aid authors in sourcing and collating all data relevant to their work.

Erythrolamprus miliaris (Linnaeus, 1758) (military ground snake; formerly within *Liophis*; see Grazziotin et al., 2012) is a widespread South American snake found almost throughout the Amazonian-Orinoco Lowlands and Eastern Highlands of Brazil and all adjacent countries west to eastern Ecuador, as well as in the Gran Chaco and Pampas in southeastern Bolivia, eastern Paraguay, northern Argentina, and Uruguay. There are five recognised subspecies (*E. m. amazonicus*, *E. m. chrysostomus*, *E. m. merremi*, *E. m. miliaris*, and *E. m. orinus*; Uetz et al., 2019); a sixth subspecies, *E. m. semiaureus* (Cope, 1862), has recently been considered to be a full species (Giraudo et al., 2006). This medium-sized snake (growing to at least 101.5 cm in snout-vent length; Pizzatto and Marques, 2006) is regarded as a common species and mostly occurs around lakes, streams and swampy habitat (Dixon, 1980, 1983; Sazima and Haddad, 1992), but has also been recorded in mangrove and marine ecosystems (Marques and Souza, 1993; Duarte et al., 2014). Although largely a semi-aquatic and terrestrial snake, it also occasionally searches for prey in bromeliads (Rocha and Vrcibradic, 1998). Populations of *E. miliaris* are regarded as stable and the species is categorised as Least Concern following guidelines of the IUCN Red List (Nogueira et al., 2019).

E. miliaris is known as a generalist feeder on live prey, though necrophagy has also been reported (Sazima and Strüssmann, 1990; Gomes et al., 2017). It feeds on amphibians and fishes (e.g. Lema et al., 1983; Sazima and Haddad, 1992; Pombal, 2007), also taking reptilian prey (Machado et al., 1998; Bonfiglio and Lema, 2006), and there is one reported case of mammalian prey (Batista et al., 2019). Seemingly due to the widespread range and common occurrence of this predator, numerous reports of predation events have been published. However, only a handful of papers are commonly cited and a dietary overview of the species is absent, which could lead to incorrect statements of novel prey species.

Here, I provide an overview of prey species reported for *E. miliaris* based on data collated from published and unpublished manuscripts and reports to better understand its ecological niche. Further, I provide a set of recommendations to aid information collation in order to prevent future incomplete statements. In addition to other tools (Grundler, 2020), authors can use these recommendations to optimise collating available natural history information for their study taxa (Table 1); e.g. aid novelty assessment of field observations and aid to provide complete overviews of natural history events.

Methods

Sourcing and collating all available natural history literature is not straightforward as reports and data are published in a wide variety of journals, both in well-known and lesser-known journals, indexed and non-indexed journals, as well as in “grey” literature (non-peer-reviewed [NGO/governmental/research] reports and theses[1]). In November 2019, I searched and reviewed both published and unpublished literature, collating records of prey of *E. miliaris*. For this literature review I utilised: scientific search engines, as well as databases of general herpetological journals, journals with a regional scope, journals of Natural History museums, journals that are currently discontinued, as well as thesis (B.Sc., M.Sc. and Ph.D.) databases of universities, the R package SquamataBase (R Core Team, 2019; Grundler, 2020), and the Brazilian Scientific Electronic Library Online (SciELO) (Table 1). During searches I used both current and previous nomenclature of the taxa of interest (current = *E. miliaris*, previous = *Liophis miliaris*), and search keywords (e.g. predation, prey and diet) both in English and Portuguese. These were further used through Google searches to identify documents of interest, such as unpublished reports. I also utilised iNaturalist to source photographic records of predation events, but suggest that those data are only included after direct communication with the submitting user to better understand the in-situ circumstances and outcome. Furthermore, I identified additional documents of interest that report natural history information from species accounts on online platforms and resources (AmphibiaWeb, 2019; Reptile Database [Uetz et al., 2020]) (Table 1). I note that a small number of additional prey species have been reported in theses (Marques, 1998; Pizzatto, 2003; Figueiredo-de-Andrade, 2017; Reiss, 2017), however I refrained from including them as I did not have permission to include these or was unable to contact the author. Lastly, here I report the currently accepted nomenclature of previously reported amphibian prey items (Frost, 2019).

Results and discussion

Reported natural predation events by *E. miliaris* include species of mammals, reptiles, and fishes, but mainly concern species of Amphibia (Table 2). In total these records constitute 52 unique nomenclature records of which 44 species were determined to species level:

Table 1. Recommendations to optimise collating of natural history information for study taxa. [1] If natural history information reported in recently concluded theses have not been published, then it would be considered polite to contact the author to request permission for data usage. [2] These online platforms and resources should not themselves be used as reference source but can aid the identification of documents in which natural history information is reported. [3] It is advised to contact the observer directly to understand in-situ conditions and outcome of the recorded event.

Recommendations	
Action	*Info*
Search for information using current and previous nomenclature of relevant taxa	Common differences originate from subspecies names used as full species, moves between genera, and beware of potential misspellings
Use keywords in different languages	English and language(s) of range countries of relevant taxa
Use scientific search engines and databases	e.g. Google Scholar, ResearchGate, Scopus, Web of Science
Search in journal databases	e.g. Amphibian & Reptile Conservation, Bibliotheca Herpetologica, Captive & Field Herpetology, Check List, Copeia, Herpetozoa, Herpetologica, Herpetological Conservation and Biology, Herpetological Monographs, Herpetological Review, Herpetology Notes, IRCF Reptiles & Amphibians, Mertensiella, Russian Journal of Herpetology, Sauria, The Herpetological Bulletin
Search in regional (non-English) journals and databases	e.g. African Journal of Herpetology, American Midland Naturalist, Asiatic Herpetological Research, Caribbean Herpetology, Cuadernos de Herpetología, Journal of the Bombay Natural History Society, Mesoamerican Biology, Neotropical Biodiversity, Phyllomedusa, Revista Brasileira de Biologia, SciELO, Scientia Hondurensis
Search in journals published by Natural History museums	e.g. Breviora, Spixiana, Treubia
Search in journals with specific taxonomic scope, also those that focus on the other species in potential interactions	e.g. Biawak, Chelonian Conservation and Biology. And, e.g. Journal of Arachnology (Arachnids), Wilson Bulletin (Aves)
Search in journals that are discontinued	e.g. Biociências, Hamadryad, Mesoamerican Herpetology, Iguana (now IRCF), Gekko (The Journal of the Global Gecko Association)
[1] Search in university databases	B.Sc., M.Sc. and Ph.D. theses
[2] Search in online platforms and resources	e.g. AmphibiaWeb (2020), Amphibians of the World Database (2020), Biodiversity Heritage Library, IUCN (2020), and the Reptile Database (Uetz et al., 2020)
[3] Search in citizen science and social media platforms	e.g. iNaturalist, taxa-focussed groups on Facebook
Contact species experts or principal investigators	for an assessment of collated publications and advise on additional publications

with the highest representation of amphibians (n = 34; 77%), followed by fishes (n = 6; 14%), reptiles (n = 3; 7%), and mammals (n = 1; 2%). Amphibian prey items determined to species level are mainly represented by the families Hylidae (n = 11), Leptodactylidae (n = 8), and Bufonidae (n = 6); more specifically in the genera *Leptodactylus* (n = 6) and *Rhinella* (n = 6), both considered to be terrestrial. Although most reports concern adult amphibians, other anuran ontogenetic stages are reported as well, such as juvenile specimens (Pombal, 2007), tadpoles (Martins et al., 1993; Palmuti et al., 2009; Fróis et al., 2017), as well as foam nests and deposited eggs (Mendes Castanho, 1996; Lingnau and Di-Bernardo, 2007; Hartmann et al., 2009; Figueiredo-de-Andrade and Kindlovits, 2012; Giori et al., 2016). Insects are also occasionally reported from dissected specimens, however these are likely secondary prey items from primary anuran prey (Barbo et al., 2011).

Although Table 2 concerns reports of natural observations, some authors have reported prey items

Table 2. Overview and outcome of predation attempts on prey items reported for *Erythrolamprus miliaris*. Original reported amphibian nomenclature was updated following (Frost, 2019). [4]Received permission to include thesis data.

Prey species	Outcome	Source
Actinopterygii		
Bathygobius soporator (Valenciennes, 1837)	Predation	Marques and Souza (1993)
Callichthys callichthys Linnaeus, 1758	Predation+Escape (active physical resistance)	Vrcibradic et al. (2012); Cadena-Ortiz et al. (2017)
Geophagus brasiliensis (Quoy & Gaimard, 1824)	Predation	Albolea (1998)[4]
Guavina guavina (Valenciennes, 1837)	Predation	Albolea (1998)[4]; Marques and Sazima (2004); Duarte et al. (2014)
Gymnotus javari Albert, Crampton & Hagedorn, 2003	Predation	Tipantiza-Tuguminago et al. (2019)
Synbranchus marmoratus Bloch, 1795	Predation	Morato (2005)[4]; Farina et al. (2019); Fiorillo et al. (2020)
Pyrrhulina sp.	Predation	Tipantiza-Tuguminago et al. (2019)
Amphibia		
Aplastodiscus leucopygius (Cruz and Peixoto, 1985)	Predation	Sazima and Haddad, (1992); Haddad and Sawaya (2000)
Bokermannohyla aff. *circumdata* (Cope, 1871)	Predation	Hartmann et al. (2009)
Boana albomarginata (Spix, 1824)	Predation	Sazima and Strüssmann, (1990); Mattos et al. (2016)
Boana faber (Wied-Neuwied, 1821)	Predation+Escape (too large)	Sazima and Haddad, (1992); Martins et al. (1993); Toledo et al. (2007); Forti and Bertoluci (2012); Rocha-Lima et al. (2018)
Boana prasina (Burmeister, 1856)	Predation	Sazima and Haddad (1992)
Boana pulchella (Duméril and Bibron, 1841)	Predation	Farina et al. (2019)
Chiasmocleis carvalhoi (Nelson, 1975)	Predation	Hartmann et al. (2009)
Chthonerpeton viviparum Parker and Wettstein, 1929	Predation	Albolea (1998)[4]; Chicarino et al. (1998); Marques and Sazima (2004)
Dendropsophus anceps (Lutz, 1929)	Predation	van den Burg and Miguel (2020)
Dendropsophus elegans (Bastos & Pombal, 1996)	Predation	van den Burg and Miguel (2020)
Dendropsophus minutus (Peters, 1872)	Predation	Sazima and Haddad (1992)
Elachistocleis bicolor (Guérin-Méneville, 1838)	Predation	Lema et al. (1983)
Hylidae sp.	Predation	Albolea (1998)[4]; Marques and Sazima (2004)
Hylodes meridionalis (Mertens, 1927)	Predation	Lima and Colombo (2008)
Leptodactylidae sp.	Predation	Palmuti et al. (2009)
Leptodactylus fuscus (Schneider, 1799)	Predation	Oda et al. (2009)
Leptodactylus gracilis (Duméril and Bibron, 1840)	Predation	Lema et al. (1983)
Leptodactylus latrans (Steffen, 1815)	Predation+Escape (too large)	Giori et al. (2016); Rocha-Lima et al (2018); de Oliviera et al. (2019); Fiorillo et al. (2020)
Leptaodactylus labyrinthicus (Spix, 1824)	Escape (too large)	Sazima and Martins (1990)
Leptodactylus notoaktites Heyer, 1978	Predation	Morato (2005)[4]; Carvalho et al. (2019); Fiorillo et al. (2020)
Leptodactylus ocellatus (Linnaeus, 1758)	Predation	Lema et al. (1983); Lingau and Di-Bernardo (2007); Figueiredo-de-Andrade and Costa (2009); Hartmann et al. (2009)
Leptodactylus cf. *ocellatus* (Linnaeus, 1758)	Predation	Pombal (2007)
Leptodactylus sp.	Predation	Fiorillo et al. (2020)
Lithobates catesbeianus (Shaw, 1802)	Predation	Silva and Ribeiro Filho (2009)
Phyllomedusa bicolor (Boddaert, 1772)	Predation	Figueiredo-de-Andrade and Kindlovits (2012); Fróis et al. (2017)
Phyllomedusa distincta Lutz, 1950	Predation	Castanho (1996)
Physalaemus atlanticus Haddad and Sazima, 2004	Predation	Hartmann et al. (2009)
Physalaemus spiniger (Miranda-Ribeiro, 1926)	Predation	Fiorillo et al. (2020)
Rhinella crucifer (Wied-Neuwied, 1821)	Predation	Albolea (1998)[4]; Marques and Sazima (2004)
Rhinella granulosa (Spix, 1824)	Predation	Michaud and Dixon (1989)
Rhinella hoogmoedi Caramaschi and Pombal, 2006	Predation	Fiorillo et al. (2020)
Rhinella icterica (Spix, 1824)	Predation	iNaturalist (https://www.inaturalist.org/observations/12717881); Fiorillo et al. (2020)
Rhinella ornata (Spix, 1824)	Predation	Duarte (2007); Hartmann et al. (2009); Muscat and Moroti (2018); Fiorillo et al. (2020)
Rhinella pygmaea (Myers and Carvalho, 1952)	Predation	Figueiredo-de-Andrade (2017)
Rhinella sp.	Predation	Albolea (1998)[4]; Marques and Sazima (2004); Fiorillo et al. (2020)
Scinax alter (Lutz, 1973)	Predation	Rocha and Vrcibradic (1998); Figueiredo-de-Andrade and Costa (2009)
Scinax sp.	Predation	Morato (2005)[4]; Gomes et al. (2017)
Stereocyclops incrassatus Cope, 1870	Escape (secretion produced by frog)	Guerrero et al. (2010)

Table 2. Continued

Prey species	Outcome	Source
Thoropa miliaris (Spix, 1824)	Predation	Albolea (1998)[4]; Marques and Sazima (2004); Mônico et al. (2016)
Trachycephalus mesophaeus (Hensel, 1867)	Predation	de Oliveira and Da Silva (2007)
Xenohyla truncata (Izecksohn, 1959)	Predation	Rocha and Vrcibradic (1998)
Mammalia		
Oligoryzomys nigripes (Olfers, 1818)	Predation	Batista et al. (2019)
Reptilia		
Helicops infrataeniatus Jan, 1865	Predation	Bonfiglio and Lema (2006)
Leposternon microcephalum Wagler, 1824	Predation	Albolea (1998)[4]; Chicarino et al. (1998)
Placosoma glabellum (Peters, 1870)	Predation	Machado et al. (1998); Fiorillo et al. (2020)

from *E. miliaris* held in captivity. Prey items only recorded from specimens in captivity include *Boana albopunctata*, *Phyllomedusa rohdei* and *Scinax fuscovarius* (Sazima, 1974), *Gymnotus carapo*, *Leptodactylus latinasus*, *Physalaemus gracilis*, *Physalaemus cuvieri* and *Pseudis minuta* (Lema et al., 1983), *Scinax pachycrus* (Lima and Juncá, 2002), and *Erythrolamprus miliaris* (Braz et al., 2006). Furthermore, prey items summarised by Michaud and Dixon (1989) as taken from Vitt (1983) were not included here as the later work concerns *Liophis miliaris mossoroensis* (Hoge & Lima-Verde, 1973), which is currently regarded as a full species, *E. mossoroensis*s. We also excluded the reports of predation on *Leptodactylus latrans* (as *L. ocellatus*) (Gallardo, 1977; Xavier and Quintela, 2007), on *Chthonerpeton indistinctum* (Lema et al., 1983), and on unidentified Hylidae and Bufonidae (Di-Bernardo et al., 2007), as these concerned *E. semiaureus* based on geographic data (Dixon, 1983). Ex-situ, *Trachycephalus mesophaeus* was offered and ingested by *E. miliaris* but five minutes later regurgitated (alive) assumingly due to noxious secretions (Toledo et al., 2011), although it has been found in a dissected *E. miliaris* (de Oliveira and da Silva, 2007). Lastly, *Teius teyou* was reported as prey by Lema et al. (1983), although no statement was provided whether it concerned a wild or captive predation event; hence I refrained from adding it to Table 2.

Data from citizen science platforms is increasingly been used in scientific publications (Follet and Strezov, 2015), and although the quality has been questioned several papers found it to be high quality or suggested methods to assess both quality and trustfulness (e.g. Hunter et al., 2013; Kosmala et al., 2016; Maritz and Maritz, 2020). Here, I identify four iNaturalist records that show *E. miliaris* predation events; observations 8971972, 12717881, 31200577, and 44944447. However, only one predation record (12717881) provides prey taxonomic details, as well as information about in-situ conditions and predation outcome; therefore I took a conservative approach and only included that record in Table 2. Recommended requests for information from the observer could help to gain insight into recorded events, though were not answered before submission of this manuscript. iNaturalist could aid researchers in identifying records concerning species interaction by adding a filterable 'species-interaction' box.

Complete lists of species interactions, either as prey or predator, are a valuable resource to consult and imperative for understanding a species' biology. The effort to compile such natural history lists differs per species. Its complexity depends on factors e.g. nomenclatural history, bibliographic history, and the size and knowledge about geographic range. Then, at what point are authors satisfied about their literature search efforts? Here I assessed records from >20 journals as well as records from numerous books, theses and congress notes. To obtain as many records as possible, it is therefore evident that authors should search a range of different sources and not limit their searches to a small set of journals that focus on natural history publications.

Collating all relevant data and research findings is not always straightforward, especially for non-indexed journals, as well as those findings in grey literature, or in journals that are discontinued or lack (complete) digital databases. In fact, successful collation of all relevant literature is becoming more difficult and time-consuming as publication rates and the number of scientific journals continue to increase (Franzoni et al., 2011; Pautasso, 2012; Gu and Blackmore, 2017; Krenn and Zeilinger, 2020). The increasing number of scientists and submissions is also pressuring scientific journals and the peer-review system (Arns, 2014). Given the high demand on scientific journals and the peer-review system, both reviewers and editors lack the time to perform time-consuming literature reviews to assess the correctness of statements on natural history observations or range extensions. Thus, authors of such manuscripts are expected to have performed thorough literature assessments. Evidently, the field is in need of a centralised herpetofauna database where all data (e.g. natural history) and publications are collated, which would be of the greatest use to authors, reviewers, and editors alike (see Grundler, 2020 for such a database of snake diet records).

This manuscript provides a dietary overview as reported for *E. miliaris* and recommendations to perform such overviews for other taxa. Collated reports demonstrate our current knowledge of the ecological niche of *E. miliaris*, highlighting that amphibians are the most commonly reported prey items for this widespread predator. Given this wide range and common occurrence of *E. miliaris* it is expected that future observations will continue to increase our knowledge of its prey diversity and evenness, with this overview accommodating their identification. Furthermore, Table 1 provides recommendations that can aid the collation of relevant natural history information so that all available knowledge can be assessed ahead of manuscript preparation and submission. Ahead of a centralised database, as aforementioned, journals can aid authors in their effort to collect relevant information by adding here provided (Table 1) or similar recommendations to their websites (e.g. on author guideline webpages), especially journals that publish large numbers of natural history or range extension notes (e.g. Herpetological Review, Herpetology Notes).

Acknowledgements. I would like to thank Hinrich Kaiser, Tom Brown and three anonymous reviewers for their insights and improving an earlier version of this manuscript. Also, I thank Aracy Albolea and Sérgio Morato for allowing me to include data from their Ph.D. theses in this overview.

References

Albolea, A.B.P. (1998): Padrões de atividade em serpentes não peçonhentas de interesse medico: *Helicops modestus* (Colubridae: Xenodontinae) e *Liophis miliaris* (Colubridae: Xenodontinae) e sua relação com a epidemiologia. MSc thesis, Universidade Guarulhos, São Paulo, Brazil.

Alencar, L.R.V., Gaiarsa, M.P., Martins, M. (2013): The evolution of diet and microhabitat use in pseudoboine snakes. South American Journal of Herpetology **8**: 60–66.

AmphibiaWeb (2019): http://amphibiaweb.org. University of California, Berkeley, CA, USA. Accessed 31 October 2019.

Arns, M. (2014): Open access is tiring out peer reviewers. Nature **515**: 467.

Barbo, F.E., Marques, O.A.V., Sawaya, R.J. (2011): Diversity, natural history, and distribution of snakes in the municipality of São Paulo. South American Journal of Herpetology **6**: 135–160.

Batista, S.F, Facure, K.G., Marques, O.A.V. (2019): First record of mammal consumption by *Erythrolamprus miliaris*. How wide is the diet of this water snake? Herpetology Notes **12**: 713–715.

Bonfiglio, F., Lema, T. (2006): Ofiofagia em *Liophis miliaris* (Serpentes, Colubridae). Biociências **14**: 221–222.

Braz, H.B.P., Lopes, P.H., Rocha, M.M.T., Furtado, M.F.D. (2006): *Liophis miliaris* (Common water snake): Cannibalism. Herpetological Bulletin **97**: 36–37.

Cadena-Ortiz, H., Barahona, A., Bahamonde-Vinueza, D., Brito, J. M. (2017): Anecdotal predation events of some snakes in Ecuador. Herpetozoa **30**: 93–96

Carvalho, B.H.G., Struett, M.M., Leivas, P.T. (2019): Predation of *Leptodactylus notoaktites* (Anura: Leptodactylidae) by *Erythrolamprus miliaris* (Squamata: Dipsadidae) in Atlantic Forest, Southern Brazil. Herpetology Notes **12**: 1029–1030.

Castanho, L.M. (1996): *Phyllomedusa distincta* (Leaf-frog). Predation. Herpetological Review **27**: 141.

Chicarino, M.S., Endo, W., Marques, O.A.V. (1998): Atividade, ciclo reprodutivo e dieta da cobra-d'água *Liophis miliaris*, na porção sul da Mata Atlântica. In: Congresso Brasileiro de Zoologica, Recife. Resumos, pp. 271–272.

de Lima Pereira, K.D., Vieira Teixeira, J., de Jesus N. Silva, E.M., Vaz Ribeiro, M. (2020): Predation attempted on *Iguana iguana* (Squamata: Iguanidae) by *Lontra longicaudis* (Carnivora: Mustelidae) in the state of Tocantins, Brazil. Herpetology Notes **13**: 491–493.

de Oliveira, I.S., da Silva, M.O. (2007): *Phrynohyas* spp. (Golden-eyed Treefrogs). Predation. Herpetological Review **38**: 70.

de Oliviera, L.C.C., Leite, A.K., Pagel, G.S., de Araú-jo Araüjo, H., Tinôco, M.S. (2019): *Erythrolamprus miliaris merremi* (Watersnake). Diet. Herpetological Review **50**: 800.

Di-Bernardo, M., Borges-Martins, M., Oliveira, R.D., Pontes, G.M.F., Nascimento, L.B., Oliveira, M.E. (2007): Taxocenoses de serpentes de regiões temperadas do Brasil. In: Nascimento, L.B., Bernardes, A.T., Cotta, G.A. (Eds) Herpetologia no Brasil 2. PUCMG, Belo Horizonte, pp. 222–263

Dixon, J.R. (1980): The neotropical colubrid snake genus *Liophis*: The generic concept. Milwaukee Public Museum, Contributions in Biology and Geology **31**: 1–40.

Dixon, J.R. (1983): Taxonomic status of the South American snakes *Liophis miliaris*, *L. amazonicus*, *L. chrysostomus*, *L. mossoroensis* and *L. purpurans* (Colubridae: Serpentes). Copeia **1983**: 791–802.

Duarte, M.R. (2007): *Liophis miliaris* (Common Water Snake). Prey. Herpetological Review **38**: 208.

Duarte, M.R., Neto, D.G., Vaske Jr., T., Pinheiro, M.A.A. (2014): Predation on the sleeper goby, *Guavina guavina* (Perciformes, Eleotridae), by the military ground snake, *Erythrolamprus miliaris orinus* (Serpentes, Dipsadidae), in a mangrove area of Southeastern Brazil. Herpetology Notes **7**: 577–580.

Farina, R.K., Dias, J., Tozetti, A.M. (2019): *Erythrolamprus miliaris* (Military Ground Snake). Diet and foraging behavior. Herpetological Review **5**: 799–800.

Figueiredo-de-Andrade, C.A., Costa, H.C. (2009): *Scinax alter*. Predation. Herpetological Bulletin **109**: 39–40.

Figueiredo-de-Andrade, C.A., Kindlovits, G.M. (2012): Predation on an egg clutch of *Phyllomedusa rohdei* Mertens, 1926 by the water snake *Liophis miliaris* (Linnaeus, 1758). Herpetology Notes **5**: 259–260.

Figueiredo-de-Andrade, C.A. (2017): História natural de *Rhinella pygmaea* (Myers & Carvalho, 1952) espécie endemic da Mata Atlântica do sudeste Brasileiro. PhD thesis, Universidad Estadual do Norte Fluminense Darcy Ribeiro, Campos dos Goytacazes, Brazil.

Fiorillo, B.F., da Silva, B.R., Menezes, F.A., Marques, O.A.V., Martins, M. (*in press*): Composition and natural history of snakes from Etá farm region, Sete Barras, south-eastern Brazil. ZooKeys.

Follett, R., Strezov, V. (2015): An analysis of citizen Science based research: usage and publication patterns. PLoS ONE **10**: e0143687.

Forti, L.R., Bertoluci, J. (2012): Distress call of *Hypsiboas faber* (Anura: Hylidae) during a *Liophis miliaris* (Serpentes: Colubridae) attack. Herpetology Notes **5**: 187–188.

Franzoni, C., Scellato, G., Stephab, P. (2011): Changing incentives to publish. Science **333**: 702–703.

Fróis, R.P.S., Brandão, R.A., Carvalho, J.C. (2017): *Erythrolamprus miliaris* (Military Ground Snake). Diet. Herpetological Review **48**: 859.

Frost, D.R. (2019): Amphibian Species of the World: an Online Reference. Version 6.0 (31 October 2019).

Gallardo, J.M. (1977): Reptiles de los alrededores de Buenos Aires. Editorial Unversitaria de Buenos Aires, pp. 213.

Giori, E.O., Favoretti, J.P.P., Clemente-Carvalho, R.B.G. (2016): *Erythrolamprus miliaris* (Cobra D'agua; Military Ground Snake). Diet. Herpetological Review **47**: 311.

Giraudo, A.R., Arzamendia, V., Caccialim, P. (2006): Geographic variation and taxonomic status of the southernmost populations of *Liophis miliaris* (Linnaeus, 1758) (Serpentes: Colubridae). The Herpetological Journal **16**: 213–220.

Gomes, D.F., Gonzalez, R.C., Silva-Soares, T. (2017): *Erythrolamprus miliaris* (Linnaeus, 1758) (Serpentes: Dipsadidae): report on an unusual event of necrophagy. Herpetology Notes **10**: 417–419.

Grazziotin, F.G., Zaher, H., Murphy, R.W., Scrocchi, G., Benavides, M.A., Zhang, Y.-P., Bonatto, S.L. (2012): Molecular phylogeny of the New World Dipsadidae (Serpentes: Colubroidea): a reappraisal. Cladistics **28**: 437–459.

Gu, X., Blackmore, K. (2017): Characterisation of academic journals in the digital age. Scientometrics **110**: 1333–1350.

Guerrero, A.C., Amaro, R.C., Rodrigues, M.T. (2010): *Stereocyclops incrassatus* (Brazilian Dumpy Frog) – Defensive Behavior. Herpetological Review **41**: 210.

Grundler, M. (2020): SquamataBase: a natural history database and R package for comparative biology of snake feeding habits. Biodiversity Data Journal **8**: e49943.

Haddad, C.F.B., Sawaya, R.J. (2000): Reproductive modes of Atlantic Forest hylid frogs: A general overview and the description of a new model. Biotropica **32**: 862–871.

Hartmann, P.A., Hartmann, M.T., Martins, M. (2009): Ecology of a snake assemblage in the Atlantic Forest of southeastern Brazil. Papéis Avulsos de Zoologia **49**: 343–360.

Hunter, J., Alabri, A., van Ingen, C. (2013): Assessing the quality and trustworthiness of citizen science data. Concurrency and Computation: Practice and Experience **25**: 454–466.

Kosmala, M., Wiggins, A., Swanson, A., Simmons, B. (2016): Assessing data quality in citizen science. Frontiers in Ecology and the Environment **14**: 551–560.

Krenn, M., Zeilinger, A. (2020): Predicting research trends with semantic and neural networks with an application in quantum physics. Proceedings of the National Academy of Sciences **117**: 1910–1916.

Lema, T., Leitão-de-Araújo, M., Azevedo, A.C.P. (1983): Contribuição ao conhecimento da alimentação e do modo alimentar de serpentes do Brasil. Communicações do Museo de Ciências da PUCRS **26**: 41–121.

Lima, F.M.P., Acuna-Junca, F**.** (2002): Impalatabilidade de girinos de *Hyla semilineata* (Anura: Hylidae) a serpentes do genero *Liophis* (Colubridae: Xenodontinae). Sitientibus, Serie Ciencias Biologicas **2**: 82–84.

Lima, A.F.B., Colombo, P. (2008): Observação do comportamento predatório de *Liophis miliaris orinus* (Serpentes, Colubridae) em *Hylodes meridionalis* (Anura, Hylodidae), Serra Geral, Rio Grande do Sul, Brasil. Revista Brasileira de Zoociências **10**: 73–76.

Lingnau, R., Di-Bernardo, M. (2006): Predation on foam nests of two leptodactylid frogs by *Solenopsis* sp. (Hymenoptera, Formicidae) and *Liophis miliaris* (Serpentes, Colubridae). Biociências **14**: 223–224.

Machado, R.A., Bernardes, P.S., Morato, S.A.A. (1998): *Liophis miliaris* (common water snake). Prey. Herpetological Review **29**: 45.

Maritz, R.A., Maritz, B. (2020): Sharing for science: high-resolution trophic interactions revealed rapidly by social media. PeerJ **8**: e9485.

Marques, O.A.V. (1998): Composição faunística, históríanatural e ecologia de serpentes da Mata Atlântica, na Região da Estação Ecológica Juréia-Itatins, São Paulo, SP. PhD thesis, Universidade de São Paulo, São Paulo, Brazil.

Marques, O.A.V., Sazima, I. (2004): História natural dos répteis da estação ecológica Juréia-Itatins. In: Marques, O.A.V., Duleba, W. (Eds), Estação Ecológica Juréia-Itatins. Ambiente Físico, Flora e Fauna. Holos, Ribeirão Preto, pp. 257–277.

Marques, O.A.V., Souza, V.C. (1993): Nota sobre atividade alimentar de *Liophis miliaris* no ambiente marinho (Serpentes, Colubridae). Revista Brasileira de Biologia **53**: 645–648.

Martins, M., Sazima, I., Silvia, G.E. (1993): Predators of the nest building gladiator frog, *Hyla faber*, in southeastern Brazil. Amphibia-Reptilia **14**: 307–309.

Mattos, R.O., Lauvers, W.D., Mônico, A.T. (2016): *Erythrolamprus miliaris* (Cobra D'água; Military Ground Snake). Diet. Herpetological Review **47**: 682.

Mayor-Victoria, R., Alvaro Botero-Botero, A. (2009): Dieta de la nutria neotropical *Lontra longicaudis* (Carnívora, Mustelidae) en el Río Roble, Alto Cauca, Colombia. Acta Biológica Colombiana **15**: 237–244.

Menin, M., de Jesus Rodrigues, D., de Azevedo, C.S. (2005): Predation on amphibians by spiders (Arachnida, Araneae) in the Neotropical region. Phyllomedusa **4**: 39–47.

Michaud, E.J., Dixon, J.R. (1989): Prey items of 20 species of the neotropical colubrid snake genus *Liophis*. Herpetological Review **20**: 39–41.

Mônico, A.T., Krause, E.H., Ferreira, R.B. (2016): *Erythrolamprus miliaris* (Cobra D'água; Military Ground Snake). Prey. Herpetological Review **47**: 311.

Morato, S.A.A. (2005): Serpentes da Região Atlântica do Estado do Paraná, Brasil: diversidade, distribuição e ecologia. PhD thesis, Universidade Federal do Paraná, Curitiba, Brazil.

Muscat, E., Moroti, M.T. (2018): Predation of *Rhinella ornata* (Anura: Bufonidae) by the water snake *Erythrolamprus miliaris* (Squamata: Dipsadidae) in São Paulo, Brazil. Herpetology Notes **11**: 449–450.

Nogueira, C., Cisneros-Heredia, D.F., Gonzales, L., Schargel, W., Rivas, G. (2019): *Erythrolamprus miliaris*. *The IUCN Red List of Threatened Species* 2019: e.T44581708A44581717. Downloaded on 30 October 2019.

Oda, F.H., Custodio, R.J., Campos, V.A., Dartora, A., Felismino, M.F. (2009): *Leptodactylus fuscus* (Rufous Frog). Predation. Herpetological Review **40**: 432–433.

Palmuti, C.F.S., Cassimiro, J., Bertoluci, J. (2009): Food habits of snakes from the RPPN Feliciano Miguel Abdala, an Atlantic Forest fragment of southeastern Brazil. Biota Neotropica **9**: 263–269.

Pautasso, M. (2012): Publication growth in biological sub-fields: patterns, predictability and sustainability. Sustainability **4**: 3234–3247.

Pizzatto, L. (2003): Reprodução de *Liophis miliaris* (Serpentes: Colubridae) no Brasil: influência histórica e variações geográficas. MSc thesis, Universidade Estadual de Campinas, Campinas, Brazil.

Pizzatto, L., Marques, O.A.V. (2006): Interpopulational variation in sexual dimorphism, reproductive output, and parasitism of *Liophis miliaris* (Colubridae) in the Atlantic forest of Brazil. Amphibia-Reptilia **27**: 37–46.

Pombal-Jr, J.P. (2007): Notas sobre predação em uma taxodenose e anfibios anuros no sudeste do Brasil. Revista Brasiliera de Biologia **50**: 463–468.

R Core Team (2019): R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/.

Reis, R.R. (2017): Fauna de squamata da Reserva Particular do Patrimônio natural Estação Veracel, litoral sul do estado da Bahia, Brasil. MSc thesis, Universidade Federal do Espírito Santo, Vitória, Brazil.

Rocha, C.F.D., Vrcibradic, D. (1998): Reptiles as predators of vertebrates and as preys in a resting habitat of southeastern Brazil. Ciência e Cultura **50**: 364–368.

Rocha-Lima, A.B.C., Santos, I., Duarte, L.S.C., Costa, W.P. (2018): *Erythrolamprus miliaris orinus* (Reptilia, Squamata, Dipsadidae): tentativas de predação de *Boana faber* e *Leptodactylus latrans*. Boletim do Museu Paraense Emílio Goeldi, Ciências Naturais, Belém **13**: 455–460.

Sánchez-Hernández, J. (2020): Reciprocal role of salamanders in aquatic energy flow pathways. Diversity **12**: 32. doi:10.3390/d12010032.

Sazima, I. (1974): Experimental predation on the leaf-frog *Phyllomedusa rohdei* by the water snake *Liophis miliaris*. Journal of Herpetology **8**: 376.

Sazima, I., Haddad, C.F.B. (1992): Répteis da Serra do Japi: notas sobre história natural. In: História Natural da Serra do Japi. Ecologia e Preservação de uma area florestal no sudeste do Brasil, p. 212–231. Morellato, L.P.C., Ed., Campinas, BRA, Editora da Unicamp/FAPESP.

Sazima, I., Martins, M. (1990): Presas grandes e serpentes jovens: quando os olhos são maiores que a boca. Memórias do Instituto Butantan **52**: 73–79.

Sazima, I., Strüssmann, C. (1990): Necrofagia em serpentes brasileiras: exemplos e Previsões. Revista Brasileira de Biologia **50**: 463–468.

Silva, E.T., Ribeiro Filho, O.P. (2009): Predation on juveniles of the invasive American Bullfrog *Lithobates catesbeianus* (Anura, Ranidae) by native frog and snake species in South-eastern Brazil. Herpetology Notes **2**: 215–218.

Tipantiza-Tuguminago, L., Medrano-Vizcaíno, P., Argüello, P., Auqui, E. (2019): *Erythrolampris miliaris crysostomus* (Military Ground Snake). Diet. Herpetological Review **50**: 800.

Toledo, L.F., Ribeiro, R.S., Haddad C.F.B. (2007): Anurans as prey: an exploratory analysis and size relationships between predators and their prey. Journal of Zoology **271**: 170–177.

Toledo, L.F., Sazima, I., Haddad, C.F.B. (2011): Behavioural defences of anurans: an overview. Ethology Ecology & Evolution **23**: 1–25.

Uetz, P., Freed, P., Hošek, J. (eds.) (2019): The Reptile Database, http://www.reptile-database.org, accessed 31 October 2019.

van den Burg, M.P., Miguel, I.R. (2020): Report of new predator-prey interactions of *Erythrolampris miliaris* (Linnaeus, 1758). Herpetology Notes **13**: 361–363.

Vitt, L.J. (1983): Ecology of an anuran-eating guild of terrestrial tropical snakes. Herpetologica **39**: 52–66.

Vrcibradic, D., Niemeyer, J., Figueiredo, C.A. (2012): *Liophis miliaris* (Watersnake). Diet. Herpetological Review **43**: 147–148.

Weiperth, A., Gaebele, T., Potyó, I., Puky, M. (2014): A global overview of the diet of the dice snake (*Natrix tessellate*) from a geographical perspective: foraging in atypical habitats and feeding spectrum widening helps colonization and survival under suboptimal conditions for a piscivorous snake. Zoological Studies **53**: 42.

Xavier, J.I., Quintela, F.M. (2007): Notas sobre a dieta de colubrídeos (Serpentes: Colubridae) na região sul da planície costeira do Rio Grande do Sul, Brasil. Anais do VIII Congresso de Ecologia do Brasil.

Accepted by Andrew Durso