



## ANIMAL SCIENCE

# Herpetological misinformation and sensationalism: media framing on biological and ecological aspects of the golden lancehead (*Bothrops insularis*)

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**Abstract:** The internet is currently one of the most important means of communication, which may include the circulation of misinformation. Snakes have always been a target of the sensationalist media, being pictured as scary and aggressive animals to be killed indiscriminately by humans. Such fear based on misinformation may compromise species conservation. Here, we address the spread of misinformation about *Bothrops insularis* and Queimada Grande Island in digital media, highlighting the negative impact on public perception and species conservation. The analysis of 230 online sources revealed that approximately 94% of them contained false information, many using sensationalist language, especially regarding the toxicity of the venom and the population density of the snake, as well as bringing contents that did not align with scientific data. *Bothrops insularis* is a critically endangered species endemic to the island. False information may contribute to the increase in illegal trafficking, putting the species at greater risk of extinction. We highlight the importance of responsible scientific communication, recommending more involvement of experts in content creation and the need for environmental education to combat sensationalism and promote appreciation of the ecological and pharmacological roles of snakes. Disseminating reliable information is essential for conservation and public understanding of biodiversity.

**Key words:** conservation, false information, Snake Island, scientific communication, Queimada Grande Island, sensationalism.

## INTRODUCTION

The internet is currently one of the most important means of communication in the world (Mota & Cilento 2020). Digital media, especially social networks, are frequently used by most people to create, disseminate, and consume a variety of materials (Ripoll & Matos 2017), particularly in Brazil, where digital platforms have become the main source of scientific information (CGEE 2023). We are currently facing a so-called infodemic, which is an abundance of information, and whether it is accurate or not, it can be quickly spread due to the expanding

reach of social media platforms (PAHO 2020, WHO 2024). This leads to an excessive propagation of inaccurate or false information, making it more difficult for people to identify reliable sources, a fact that has raised concerns within the scientific community (Oliveira 2020, PAHO 2020, WHO 2024). Furthermore, disinformation is also disseminated by people through various media outlets, especially social media, with the purpose of intentionally distorting information and reinforcing beliefs and opinions without any

scientific basis (Allcott & Gentzkow 2017, Forti et al. 2023).

Digital media negatively affects human perception of biodiversity, as it often portrays sharks, snakes, spiders, and some other animals as dangerous and responsible for human-animal conflicts (Sabatier & Huvencuers 2018, Mammola et al. 2020, Nanni et al. 2020). Although such encounters are, in fact, rare, the frequency of news coverage about human-wildlife encounters, especially those with graphic elements, along with the biased language used to depict these events, intensifies the public's fear towards these animals, often leading to rejection and the killing of wildlife (Langley 2005, Nanni et al. 2020). In this matter, it is important to emphasize the significant role that digital media plays in shaping public opinion (Silva & Bringel 2024), leading to a hostile and distorted view of wildlife. Although the media can serve as a valuable tool for wildlife conservation, its potential to promote misinformation and sensationalism highlights the importance of further investigation to better understand its overall impact on conservation efforts (Gerber et al. 2011, Haq et al. 2023).

Snakes are frequently misrepresented in the media, often portrayed as dangerous and aggressive creatures by sensationalist or uninformed sources (Freitas 2003, Vizotto 2003, São Pedro 2020). The media often distorts scientific facts, which leads to people harming snakes out of the mistaken belief that snakes are inherently malevolent (Freitas 2003, Vizotto 2003, Eid et al. 2021). Such unfounded fear largely originates from myths and cultural beliefs passed down through generations, which spread significant misinformation about these animals (Cosendey & Salomão 2016, Onyishi et al. 2021, Islam et al. 2024).

The fast emotional and behavioral response toward snakes in humans is widely recognized

as an innate behavior, shaped by natural selection to identify snakes as potential danger, stemming from a long history of coevolution likely driven by frequent encounters with venomous or constrictor snakes among human ancestors (Öhman et al. 2001, Öhman & Mineka 2003, Landová et al. 2018, Janovcová et al. 2019). As humans eventually became apex predators, the cognitive ability to detect snakes rapidly has diminished over time, yet remains present in modern humans (Mineka & Öhman 2002, Clinchy et al. 2016, Polák et al. 2020). The emotion associated with snakes is further reinforced by social and cultural factors, whereby humans, particularly young children, acquire a learned fear of snakes through the transmission of negative information by caregivers, peers, and mass media (Conrad et al. 2021).

Nevertheless, most of the extant snake species are harmless to humans. For instance, Brazil harbors the third highest richness of snakes, with 450 species, out of which only 79 are actually venomous to humans, including 44 species of elapids (genera *Micrurus* and *Leptomicrurus*) and 35 species of viperids (genera *Bothrocophias*, *Bothrops*, *Crotalus* and *Lachesis*; Guedes et al. 2023, Uetz 2025). However, even such venomous snakes typically display less retaliatory defensive behaviors, such as immobility, camouflage, and coiling up, whereas bites usually occur when the encounter with a possible threat is inevitable (Marques et al. 2019), supporting the idea that the fear of snakes is reinforced by social and cultural misconceptions about the natural history of these animals.

The genus *Bothrops* includes distinct phylogenetic lineages, one of which is the *Bothrops jararaca* group (Carrasco et al. 2023). This group comprises the jararaca lancehead (*B. jararaca*), found in the mainland Atlantic Forest from Rio Grande do Sul to Bahia (Nogueira et

al. 2019), and five island species – *B. alcatraz*, *B. germanoi*, *B. insularis*, *B. otavioi*, and *B. sazimai* (Sawaya et al. 2023). These island species likely originated through isolation and subsequent speciation of ancestral lancehead populations (Grazziotin et al. 2006, Barbo et al. 2022).

*Bothrops insularis* is the most widely recognized among these insular species, and one of the most extensively studied Brazilian snakes regarding its biology and ecology (e.g. Martins et al. 2008, Marques et al. 2012, 2013, Banci 2023). It is endemic to Queimada Grande Island, globally known as Snake Island. In spite of all the information above being available in scientific sources, there is still plenty of false information on *B. insularis* online, reaching many people who will eventually have a distorted idea. Both the species and the island have been the subject of numerous myths and legends, which have been perpetuated and intensified over time, particularly through the dissemination of sensationalist content in digital media, including news reports, social media posts, and online videos. Our aim was to investigate misinformation about *B. insularis* and about Queimada Grande Island in digital media. Additionally, our goal was to provide reliable information on the species and the island, based on scientific sources.

## MATERIALS AND METHODS

### Target species

The golden lancehead (*Bothrops insularis*; Amaral 1921) is a critically endangered viperid (Silveira et al. 2021), endemic to Queimada Grande Island, popularly known as Snake Island.

*Bothrops insularis* is a venomous species, which, like other *Bothrops* species, contains toxins that act on prey immobilization and tissue degradation (Gutiérrez & Rucavado 2000, Modesto et al. 2005, Kang et al. 2011). However,

its venom exhibits paedomorphic features, with toxin composition closely resembling that of juvenile *B. jararaca* (Gonçalves-Machado et al. 2016). The tip of the tail is usually dark in both juvenile and adult *B. insularis*, and may be involved in caudal luring (Andrade et al. 2010). This is a predatory strategy that consists of undulating the tail to mimic the movements of a larva or small invertebrate, to attract small anurans, lizards, and possibly birds (Heatwole & Davison 1976), which are the main prey of this semi-arboreal snake when adults. More specifically, it feeds primarily on small migratory birds (Marques et al. 2012).

### Data collection

To survey the information disseminated by digital media about *B. insularis* and Queimada Grande Island, we searched Google News articles and YouTube for videos, using the following Boolean operators in English, Portuguese, and Spanish:

- English: “*Bothrops insularis*” OR “*Bothropoides insularis*” OR “golden lancehead” OR “snake island” OR (“Queimada Grande” AND (“snake” OR “viper” OR “lancehead” OR “pitviper”))
- Portuguese: “*Bothrops insularis*” OR “*Bothropoides insularis*” OR “jararaca ilhoa” OR “Ilha das Cobras” OR “Ilha da Queimada Grande” OR (“Ilha” AND (“cobra” OR “serpente” OR “jararaca”))
- Spanish: “*Bothrops insularis*” OR “*Bothropoides insularis*” OR “serpiente de la Isla Quemada” OR “víbora dorada” OR (“Queimada Grande” OR “Quemada” AND (“víbora” OR “culebra” OR “serpiente” OR “yarárá”))

Only content published online from May 2013 to April 2025 was included in the analysis. All Google News articles and YouTube videos

related to *B. insularis* and Queimada Grande Island were screened for the presence of misinformation and sensationalist content. We also examined whether the articles and videos included any mention or consultation of specialists in the field (e.g. biologists, ecologists, herpetologists, conservationists). In addition, we recorded the number of views as an indicator of public reach, which were documented at the time of search and categorized by language.

We thoroughly reviewed the news articles and watched the YouTube videos in their entirety, in search of misinformation and sensationalism on the topics that follow, either concerning *B. insularis* or Queimada Grande Island, and based both on textual and visual content:

- Venom: we considered misinformation to be related to venom all content with incorrect information about the toxicity effects, or properties of the venom (e.g. “a snake whose venom is potent enough to melt human flesh.”; “Its venom is up to five times more potent than of its mainland relative.”; “is so potent it can kill a human in one hour”; “This particular snake has a mortality rate of 7% without treatment and up to 3% with treatment”; “golden lanceheads are the most venomous vipers in the world”; [translated] “Its venom is used to produce captopril”).
- Antivenom: we considered misinformation to be related to antivenom all content that provided incorrect information about the efficacy or even existence of an antivenom for *B. insularis* bites (e.g. [translated] “Scientists continue their fight to create an antivenom”; [translated] “intention to develop a better antivenom that would allow survival from an attack by one of them”)
- Population density: we considered misinformation to be related to population density all content that had incorrect information regarding the number of specimens or density of *B. insularis* on Queimada Grande Island (e.g. “Some reports say that there are over 425,000 snakes on this one island. That would mean that there is one snake per every square meter, so basically every three steps you are meeting a new snake”; “there are between 1 to 5 of these deadly snakes in every square meter of the island”; “Snake Island has the highest density of venomous snakes anywhere in the world”)
- Species image: we considered misinformation to be related to the image of the species all sources that contained photos or videos of species that do not correspond to *B. insularis* (e.g. a xanthic individual of *Bothrops jararaca*; an individual of *Bothriechis schlegelii*; assemblage of individuals of *Thamnophis* sp.; an albino individual of *Crotalus durissus*).
- Otherspecies: we considered misinformation to be related to other species all content bringing incorrect information about the species that occur on the island apart from *B. insularis* (e.g. “Queimada Grande Island is also home to another snake: *Dipsas mikanii*”; [translated] “This is not the only snake species found on the island. Another species present is *Micrurus corallinus*, a true coral snake”; [translated] “Another inhabitant is the snail-eating snake *Dipsas catesbyi*, a non-venomous species that feeds on snails”; [translated] “This island, with its unique biodiversity, is a true sanctuary for several snake species. One of them is the common lancehead (*Bothrops jararaca*)”)

- Queimada Grande Island info: we considered misinformation to be related to Queimada Grande Island all content bringing incorrect information about Queimada Grande Island, such as those concerning the reasons for prohibiting public visitation, the authority of the Brazilian Navy over the island, the distance between the coast of São Paulo and the island, Queimada Grande Island size, and so on (e.g. “Snake Island being 90 kilometers off the coast of Brazil”; “The Brazilian Navy, however, stops anyone but snake experts from going there as it is said you will likely be dead after landing”; “The Brazilian government has restricted access, making it off limits to the public, this is to protect visitors”; “this island is about 110 acres”).
- Queimada Grande Island image: we considered misinformation to be related to the image of Queimada Grande Island all sources that contained photos or videos of unidentified islands and other environments that do not correspond to Queimada Grande Island.
- Prey: we considered misinformation to be related to prey all content bringing incorrect information on what *B. insularis* feeds on (e.g. [translated] “They usually feed on birds and their eggs, especially the brown booby, very common on the island”; [translated] “they had to adapt to the fierce competition for food, specifically to be able to hunt migratory birds twice their size”; [translated] “this snake has developed an extremely potent venom, which allows it to capture small prey, such as small birds and rodents, with great efficiency.”)
- Habit: we considered misinformation to be related to habit all content with false information on the semi-arboreality of *B. insularis* (e.g. [translated] “the jararaca began to climb trees, which is not natural for species on the continent”; [translated] “These snakes have adapted to climb and jump from trees to hunt birds”; [translated] “It has learned to climb trees. It is the only snake in Brazil that lives in the heights, balancing”)
- Morphology: we considered misinformation to be related to morphology all content bringing incorrect information about body size and coloration of *B. insularis* (e.g. [translated] “it can grow up to 2 meters”; [translated] “Its ventral coloration is uniform, either light yellow or olive green.”)
- Defense: we considered misinformation to be related to defense all content bringing incorrect information regarding the defensive behaviors exhibited by *B. insularis* (e.g. “there is the *Bothrops insularis*, known for their aggressive nature”; “The snakes are getting more aggressive”; [translated] “they developed the ability to camouflage themselves within the local vegetation, a strategy known as mimicry”)
- Predators: we considered misinformation to be related to predators all content bringing incorrect information on the predators of *B. insularis* (e.g. [translated] “Freed from large predators to control their numbers, the snakes spread freely.”; “Snake Island is devoid of mammals, so golden lanceheads have no natural predators”)
- Activity: we considered misinformation to be related to activity all content that erroneously stated that *B. insularis* is a diurnal species (e.g. [translated] “the lancehead viper on the island have adopted diurnal habits due to the greater presence of birds during the day”)

- Origin: we considered misinformation to be related to origin all content bringing incorrect information on the origin process of *B. insularis* (e.g. [translated] “When humans began actively developing the forest, the reptiles were displaced. The snakes crossed the isthmus that existed at that time to Queimada Grande, where they continue to live to this day”)
- Threats: we considered misinformation to be related to threats all content bringing incorrect information on what threatens *B. insularis* (e.g. [translated] “threats such as invasive species”; [translated] “The collection of specimens for scientific research has further reduced their number”)
- Market value: we considered misinformation to be related to value all sources that provided incorrect information on the price of a specimen of *B. insularis* in the illegal market (e.g. [translated] “a price of approximately 30,000 euros”; [translated] “(...) poachers who risk their lives to get their hands on one of these snakes, which can fetch up to 50,000 euros on the black market”)
- Reproduction: we considered misinformation to be related to reproduction all content bringing incorrect information on *B. insularis* reproduction, including breeding cycle (e.g. [translated] “the species mates between March and July, when an average of 10 offspring is born”)
- Sensationalism: we considered as sensationalist all content with emotionally appealing terms (e.g. “Their poison is so terrible that it can melt human flesh in an instant”; [translated] “Nighttime transforms Snake Island into a place that is already terrifying during the day. At dusk, it becomes

a horror movie”; [translated] “Imagine a place where every step could be your last. A place where death lurks around every corner, not in the form of a monster, but in the form of snakes, thousands of them”)

### Adopted classification of misinformation and sensationalism

In this paper, false and inaccurate information is referred to as misinformation, which is the inadvertent spread of false information without intent to harm (Shu et al. 2020). Disinformation is false information designed to deceive others and is deliberately spread with the intent to confuse facts (Shu et al. 2020). We do not use or distinguish this term due to the difficulty in evaluating the intention of the news. The judgement on the information provided in such contents as either incorrect or outdated, including information that lacks a certain level of accuracy, was based on current and reliable scientific sources. Sensationalism (also called malinformation) is a type of editorial bias in mass media that includes over-hyped topics in order to attract more audiences (Udeze & Uzuegbunam 2013). For categorizing the materials as sensationalists, we followed the reasoning that sensationalist digital media content regarding animals typically uses emotionally charged language (e.g. Nanni et al. 2020). Thus, we classified as sensationalist any sources containing sensational terms such as “deadliest”, “most venomous”, and “melt human flesh”.

All research results were compiled into tables and graphs, and the frequency of occurrence of each topic mentioned in misinformation was calculated.

### Literature review

Detailed information on the natural history of *B. insularis* was compiled through a literature

review as part of this study. The aim was to provide a comprehensive and science-based overview of the species, serving as a counterpoint to the often-misleading portrayals found in digital media.

## RESULTS

### Data collection

We identified 230 sources that contained information about *B. insularis* and Queimada Grande Island, 69 of which were in English, 77 in Portuguese, and 84 in Spanish, with many replicates among the languages (see Supplementary Material at <https://github.com/wilianbarbosa/Herpetological-misinformation-sup-mat>). From these sources, 94.35% (n=217) contained misinformation, and 83.91% (n=193) used sensationalist language in their content. Among the 29 news articles in Portuguese, our results show that 24 (82.76%) contained misinformation, whereas all contents in English (n=16) and Spanish (n=17) did so (Table I). As for YouTube videos, 52 (98.11%) out of 53 videos in English contained misinformation, and 43 (89.6%) out of the 48 videos in Portuguese did so. The highest number of videos was in Spanish, 67 in total, of which 65 (97.01%) contained misinformation (Table II).

The most common issues in news articles (Fig. 1a) in English were related to the venom (93.75%), photos (50%), and population density and morphology of the species, each (37.5%). In Portuguese, the most common issues were venom (62.06%), population density (48.27%), and habits and diet, each (41.37%). The most common issues in Spanish were population density (82.35%), venom (70.58%), and Queimada Grande Island info and other species, each

(52.94%). Considering YouTube videos (Fig. 1b), the most common misinformation both in English and in Spanish involved venom (94.34% and 85.08%, respectively), population density (64.15% and 76.12%, respectively), and species image (58.49% and 74.63%, respectively). In Portuguese, they involved venom (83.33%), population density (54.17%), and Queimada Grande Island info (43.75%).

Sensationalism was found in 87.5%, 48.28%, and 100% of the news articles in English, Portuguese, and Spanish, respectively. Sensationalism was present in 96.23%, 64.58%, and 95.52% of YouTube videos in English, Portuguese, and Spanish, respectively.

Some online content included consultation with experts in the field. Three (18.75%) news articles and 11 (20.76%) YouTube videos in English mentioned an expert. In spite of this, all of them still contained misinformation. As for sources in Portuguese, 12 (41.38%) of the news articles and of YouTube videos (25%) mentioned an expert. Still, 66.67% and 83.33% of them, respectively, contained misinformation. Only one (1.54%) YouTube video in Spanish mentioned an expert, and it was one of the only two sources that did not contain misinformation.

Due to access limitations, the number of views of news articles was not available. As for YouTube, on average, videos in English had 2,998,019 views (range: 10 to 84,215,282), with a total of 158,894,996 views. Videos in Portuguese averaged 645,008 views (range: 10 to 12,082,208), with a total of 30,964,229 views. Videos in Spanish had an average of 132,633 views (range: 13 to 4,105,997), totaling 8,621,130 views. Cumulatively, all the YouTube videos had 198,480,355 views by the end of data collection.

**Table I.** Misinformation (Mis.) and Sensationalism (Sens.) found in news articles in English, Portuguese, and Spanish, in chronological order, with the respective websites, information on expert consultation, and errors concerning data on: population density (dens.), venom, antivenom (antiv.), habit, activity (act.), prey, predators (pred.), reproduction (rep.), morphology (morph.), origin, other species, QGI info, threats, market value, and *B. insularis* and island image (species and QGI image, respectively).

NEWS ARTICLES																			
MIS.	SENS.	WEBSITE	YEAR	ERRORS															EXPERT
				dens.	venom	antiv.	habit	act.	prey	pred.	rep.	morph.	origin	other species	QGI info	threats	value	species image	
X	X	Hollywood Soapbox	2015		X														Bryan Fry
X	X	9 News	2019		X				X										
X	X	Atlas Obscura	2022		X							X							Bryan Fry, Otavio Marques, and Selma Almeida-Santos
X		Discover	2023														X	X	Felipe Grazziotin and Stephen Mackessy
X	X	Science Focus	2023		X					X		X						X	
X	X	Times of India	2023		X							X						X	X
X	X	Times Now	2023	X	X									X				X	
X		UGA Today	2023		X														
X	X	A-Z Animals	2024	X	X									X	X			X	
X	X	A-Z Animals	2024	X	X				X			X		X	X				
X	X	IFL Science	2024	X	X														
X	X	Lad Bible	2024		X							X							
X	X	Live Science	2024		X					X		X						X	
X	X	Mirror	2024		X									X				X	
X	X	Times of India	2024	X	X									X				X	
X	X	Discover Wildlife	2025	X	X							X		X					
X	X	Ciclo Vivo	2016		X		X		X					X	X				
X		G1 Sorocaba em Notícias	2016		X		X	X	X		X								
X		o eco	2016		X														Fausto Barbo
X		Estado de Minas	2020	X															
X		Fauna News	2020		X		X	X	X		X			X					
X	X	G1 Campinas e Região	2021	X	X		X	X	X						X				Ligia Amorim
X	X	Green Me	2021	X	X		X	X	X					X	X				Ligia Amorim
X		Agência FAPESP	2022				X	X											Otavio Marques
		Costa Norte	2022																
X	X	Diário do Litoral	2022	X	X				X					X					
X		Fauna News	2022					X			X								Marcia Denise Guedes
X		Metrópoles	2022	X								X							
		Portal Butantan	2022																Otavio Marques
X	X	Uol	2022	X	X		X		X			X							
		nd+	2023																Henrique Abrahão Charles

**Table I. Continuation.**

PORTUGUESE	X	X	Terra	2023	X	X	X			X				X	X							
			CanalTech	2024																	Otávio Marques	
			Galileu	2024																		Otávio Marques
	X	X	giz_br	2024	X									X								
	X	X	GMC Online	2024	X	X					X				X							
	X	X	GMC Online	2024	X	X		X			X				X							
	X		Mar Sem Fim	2024		X				X												
	X		National Geographic Portugal	2024		X		X		X				X	X				X	X		
	X	X	O Globo	2024		X	X			X					X							
	X	X	Primeira Página	2024		X		X		X					X							Henrique Abrahão Charles
	X	X	G1 Santos	2025	X	X																Eric Comin and Otávio Marques
	X	X	National Geographic	2025	X	X		X		X			X		X							
	X	X	National Geographic	2025	X										X							
	X		Super Interessante	2025	X	X		X							X							Karina Braz
	SPANISH	X	X	Univision Noticias	2016		X			X					X							
X		X	Chispa	2019	X	X					X			X					X			
X		X	El Confidencial	2019	X	X								X					X			
X		X	Clarín	2020	X	X									X							
X		X	El Comercio	2021	X	X									X					X		
X		X	La Nacion	2021	X	X	X			X			X									
X		X	Viajar	2021	X	X				X			X							X		
X		X	Xataka	2022	X					X			X			X						
X		X	Infobae	2023	X	X				X												
																						(cont.)
X		X	Aire de Santa Fé	2024	X	X																
X	X	Canal 26	2024	X										X	X					X		
X	X	El Cronista	2024	X										X	X					X		
X	X	HuffPost	2024		X		X		X					X						X		
X	X	Infobae	2024	X										X	X							
X	X	National Geographic	2024	X	X									X	X							
X	X	National Geographic	2024	X										X	X							
X	X	National Geographic España	2024		X		X		X					X					X	X		

**Table II. Misinformation (Mis.) and Sensationalism (Sens.) found in YouTube videos in English, Portuguese, and Spanish, in chronological order, with the respective channels, information on expert consultation, number of views and errors concerning data on: population density (dens.), venom, antivenom (antiv.), habit, activity (act.), prey, predators (pred.), reproduction (rep.), morphology (morph.), origin, other species, QGI info, threats, market value, and *B. insularis* and island image (species and QGI image, respectively).**

YOUTUBE VIDEOS																						
MIS.	SENS.	CHANNEL	YEAR	VIEWS	ERRORS																EXPERT	
					dens.	venom	antiv.	habit	act.	prey	pred.	morph.	rep.	defense	origin	other species	QGI info	threats	value	species image		QGI image
X	X	Albert Tidbits	2013	486.402	X	X														X		
X	X	ABC News	2014	737.418		X															Rogério Zacariotti	
X	X	VICE	2014	9.322.859	X	X															Karina Banci	
X	X	Nat Geo Animals	2015	10.921.597		X																
X	X	Atlas Obscura	2015	389.916	X	X												X				
X	X	ben sedin	2015	26.200	X	X				X							X	X				
X	X	Discovery	2015	194.206		X												X			Bryan Fry	
X	X	Discovery UK	2018	222.497	X	X															Bryan Fry	
X	X	60 Minutes Australia	2019	13.209.060	X	X	X														Bryan Fry and Felipe Grazziotin	
X	X	Kingdom Whispers	2019	26.804		X													X	X		
X	X	RealLifeLore	2019	1.776.040		X													X	X		
X	X	What Lurks Below	2019	2.676.883		X													X			
X	X	Patryn	2019	18.092		X													X			
ENGLISH	X	X	60 Minutes Australia	2019	25.721	X	X											X			Bryan Fry	
	X	X	Terra Mater	2020	67.094		X															
	X	X	The Infographics Show	2020	682.110	X	X			X			X									
	X	X	How to Survive	2021	27.507.118	X	X															
	X	X	WildThing	2021	2.761.364	X	X													X	X	
	X	X	How to Survive	2022	74.378	X	X							X						X	X	
	X	X	Travil Itinerary	2022	1.950	X	X											X		X	X	
	X	X	Uncovering	2022	5.304	X	X													X	X	
	X	X	Crazy Creatures	2022	1.411.358		X		X									X		X		
	X	X	What If	2022	178.904	X	X											X		X	X	
	X	X	Discovery Australia	2022	285.287	X	X											X	X			Bryan Fry
	X	X	Travel Phenom	2022	4.201		X											X		X	X	
	X	X	econexa.travel	2023	11.556	X	X											X		X	X	
	X	X	Did You Know?	2023	17.478		X											X				

Table II. Continuation.

ENGLISH	X	X	How to Survive	2023	142.318	X	X													
	X	X	A-Z-Animals	2023	3.858	X	X			X				X				X	X	
	X	X	Lord Miles	2023	637.747	X	X		X						X					
	X	X	Oliver hayden	2023	25.907	X	X	X				X			X			X	X	
	X	X	Corey Ewings	2023	3.995	X	X					X			X			X	X	
	X	X	Quest TV	2023	12.738	X	X							X	X					Bryan Fry
	X	X	Quest TV	2023	7.350	X														
		X	Quest TV	2023	15.229															
	X	X	Discovery Australia	2023	58.049		X													Bryan Fry
	X	X	Destination Dreamer	2024	8.014	X	X												X	X
	X	X	Wondering	2024	4.183		X								X			X		
	X	X	Places	2024	87.979	X	X				X	X			X			X		
	X	X	momentous	2024	15.299	X	X		X		X		X					X	X	
	X		World History	2024	19.193		X											X	X	
	X	X	Khaleed.	2024	45.014		X											X	X	
	X	X	Terra Mater	2024	216.922	X	X								X					
	X	X	Night time stories	2024	505	X	X								X	X		X	X	Karina Banci
	X		PH Visitor	2024	18.445										X			X	X	
	X	X	Voice of Wisdom	2024	52.388	X	X								X			X	X	
	X	X	DISCOVERIYA	2024	33.459	X	X		X									X	X	
X	X	Daily Sphere	2025	943	X	X								X			X	X		
X	X	Facts and Stories plus!	2025	380		X						X		X	X		X	X		
X	X	Bello Mundo - EN	2025	227.531	X	X		X						X	X		X	X		
X	X	Hidden Horizon travel	2025	10	X	X											X	X		
X	X	Academy Toknow	2025	461	X	X											X	X		
X	X	MrBeast	2025	84.215.282		X	X	X											Fausto Barbo	
PORTUGUESE	X		Arraes Arraes (Ator)	2015	146.067	X	X			X				X					Karina Banci and Otavio Marques	
	X	X	O Covil	2017	11.290.496	X	X		X	X				X			X			
			Richard Rasmussen	2017	1.333.086														Richard Rasmussen	
	X		Rodney Mello	2017	1.601.952		X												Carlos Azevedo, Giuseppe Puort, and Karina Banci	

**Table II. Continuation.**

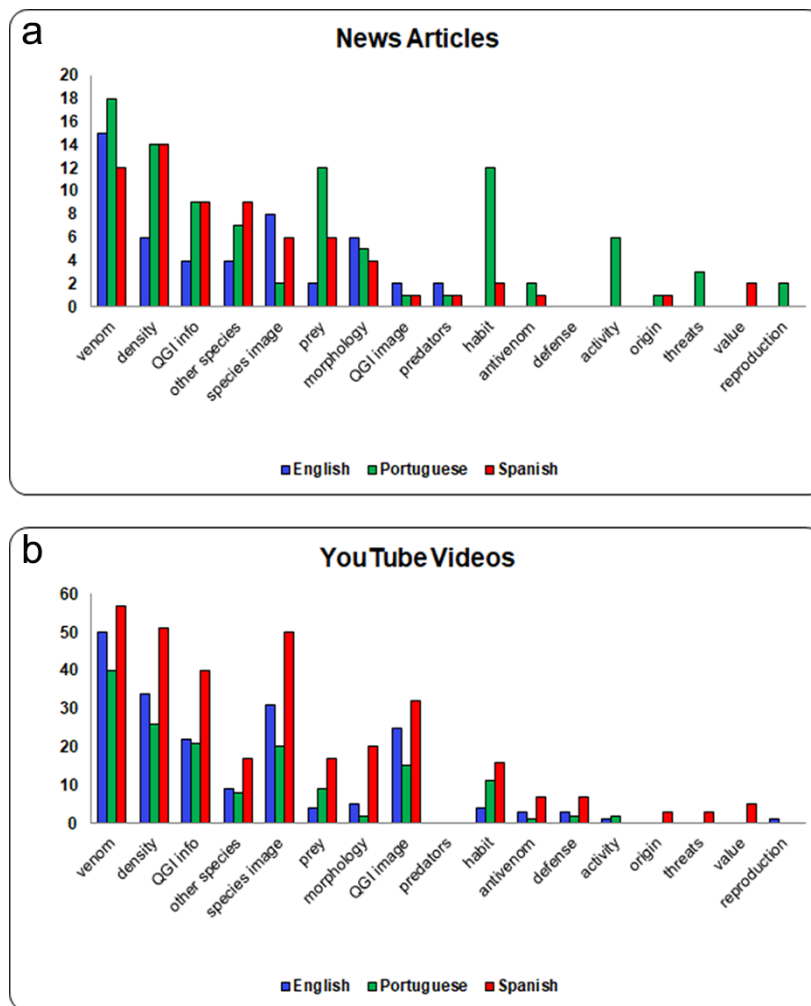
PORTUGUESE	X	X	TV FISHING BRASIL	2017	52.374	X	X	X							X			X		
	X		Papo de Cobra	2018	8.761		X													
	X	X	Thomas Gabriel	2018	161		X	X										X		
	X	X	Marcelo Sousa	2019	21.142		X								X			X		
	X	X	Você Sabia?	2019	12.082.208	X	X													
	X		Biólogo Henrique o Biólogo das Cobras	2020	157.671		X								X					Tiago Angeli
	X		Herpeto Capixaba	2020	407		X													Henrique Abrahão
			Herpeto Capixaba	2020	264													X	X	
	X		Kleber Santana	2020	55															Karina Banci, Lucas Siqueira, Natália Torello, Silara Batista, and Thiago Silva
	X		PROJETO HERPETUS	2020	2.374		X													Karina Banci, Lucas Siqueira, Natália Torello, Silara Batista, and Thiago Silva
	X		ANIMAL TV	2021	47.549	X	X													
	X		Canal ZOOJOÃO	2021	220	X				X										Guilherme Domenichelli
	X	X	INCRÍVEL	2021	336.260	X	X	X	X							X			X	X
	X	X	Ivens – Drone Riboldi	2021	38.156	X	X								X	X			X	X
	X	X	Marcel Jurado - FPV BACANA	2021	802.995	X	X	X								X				
	X	X	Nosy Drone	2021	1.487.986	X	X									X			X	
	X		Safari com Samuel	2021	96	X	X	X	X							X				
X	X	Terra Explorer	2021	5.876	X	X	X					X			X			X	X	
		Willer Dâmaso	2021	46							X									
		Agência FAPESP	2022	1.127															Otavio Marques	

**Table II. Continuation.**

PORTUGUESE			Caçadores de Horizontes - História e aventura	2022	22.573																
	X	X	National Geographic Brasil	2022	342.202	X	X		X						X			X	X		
	X	X	O BARATO DA VIAGEM	2022	6.720	X	X								X			X	X		
	X	X	Richard Rasmussen	2022	238.336	X	X														Richard Rasmussen
	X	X	Viver na praia depois dos 50	2022	7.292	X	X		X	X											
	X	X	EcnoSimples	2023	270.671	X	X								X			X			
	X		Eco Bio Help	2023	32				X												
	X	X	Lagosta	2023	123.450	X	X														
	X	X	Mente7	2023	2.556		X								X	X					
	X	X	Mistérios do Mundo	2023		X	X									X			X	X	
	X	X	Natugeo Oficial	2023	312		X			X	X				X	X					
	X	X	Explorer Fatos!	2024	2.689	X	X														Cláudio Machado
	X	X	Lambidareal	2024	323.522	X	X								X			X	X		
	X	X	Mega Mundo Incrível	2024	6.859		X					X			X			X	X		
	X	X	Melhor da Tarde	2024	4.119		X												X	X	
	X	X	Oshi Fia	2024	7		X													X	
	X		Papo de Cobra	2024	2.313		X		X							X			X	X	
	X	X	RafaLuc	2024	1.692	X	X				X										
	X	X	CURIOLHA	2025	16.012	X	X														
	X	X	Curiosidades Da Hora	2025	302	X	X				X					X					Karina Banci and Otavio Marques
X	X	MrBeast Shorts Brasil	2025	47.521		X									X			X			
X	X	Mundo Selvagem com o Davi	2025	215		X									X			X	X		
X	X	Pop Moz	2025	508	X	X	X			X	X				X			X	X		
X	X	Turma da Frente	2025	3.443	X	X									X	X			X		

Table II. Continuation.

SPANISH	X	X	Any Smith	2024	1.553	X	X							X				X	X	
	X	X	CurioMundo	2024	841	X	X								X	X			X	X
	X	X	Curiosidades del Mundo	2024	138	X	X			X									X	X
	X	X	Curiosidades del mundo	2024	1,631		X			X	X			X						
	X		Dato curioso asombroso global	2024	406	X	X													
	X	X	Desvelando el mundo	2024	15	X	X							X					X	X
	X	X	Ensamble de Ideas - Entretenimiento + Conocimiento	2024	910	X	X												X	
	X	X	Explorador	2024	4.440		X												X	
	X	X	GeoGremio	2024	248		X								X	X	X		X	X
	X	X	Historias Bíblicas	2024	1.064		X								X	X			X	X
	X	X	Historias sin Límites	2024	384		X									X			X	X
	X	X	Impacto Curioso	2024	13	X	X								X				X	X
	X	X	Intro	2024	13.238	X									X	X			X	X
	X	X	InvestiMundo	2024	11.782	X				X						X			X	X
	X	X	Kraken	2024	9.652	X	X								X				X	X
	X	X	LA MAGIA DLA CURIOSIDAD	2024	170	X	X							X					X	X
	X	X	Misterios de la Civilización	2024	643	X	X		X			X		X	X	X			X	X
	X	X	Misterios de la civilización	2024	438	X	X		X			X		X	X	X			X	X
	X	X	Moi Oficial	2024	503	X								X					X	X
	X	X	Te Vuela la Mente	2024	4,942	X	X	X	X	X	X					X			X	X
	X	X	TECNO ÉXITOS	2024	2.247		X								X				X	X
	X	X	+Interesante	2025	1.379		X	X												X
	X	X	AirTravel	2025	465		X		X							X	X		X	X
	X	X	Bello Mundo, ES	2025	566.690	X	X		X						X	X			X	
	X	X	COSAS QUE NO SABIAS	2025	2.293	X	X			X						X	X			
	X	X	El Duendecito	2025	23		X												X	X
	X	X	Lujos sin Fronteras	2025	53	X	X									X			X	X
	X	X	QUE TANTO SABES?	2025	1.707	X	X			X					X	X			X	
	X	X	RevelaBen	2025	545	X	X									X			X	X
	X	X	Venenosas & Fascinantes	2025	1.494	X	X					X			X				X	X
X	X	Viajero Curioso	2025	593		X	X							X	X			X	X	
X	X	Yerai y Los Misterios Del Universo	2025	6.093	X	X							X		X			X	X	



**Figure 1.** Misinformation found in news articles (a) in English (n=16), Portuguese (n=24), and Spanish (n=17), and in YouTube videos (b) in English (n=52), Portuguese (n=43), and Spanish (n=65), from May 2013 to April 2025.

## Literature review

We gathered information from reliable sources, such as scientific articles and academic books, focusing on the topics outlined in the Methods section of the present study. In the following section, we present the results of this bibliographic compilation, providing scientific data to clarify the actual biological and ecological aspects of *B. insularis*, as well as factual information about Queimada Grande Island:

- Venom and antivenom: *Bothrops insularis* is a venomous species, but it is neither one of the most venomous in the world nor in Brazil (Zelanis et al. 2008). There is no evidence that

the venom is able to “melt” human flesh. In fact, in spite of its unique characteristics, *B. insularis* venom is fundamentally bothropic, with physiological effects similar to those of other *Bothrops* species, since it is composed of phospholipases, metalloproteinases, and myotoxins responsible for hemorrhage, edema, and tissue necrosis (Gutiérrez & Lomonte 1995, Gutiérrez & Rucavado 2000, Modesto et al. 2005, França & Málaque 2009). Also, the venom can be neutralized by the same antivenom used to treat bites of other *Bothrops* species (Barbosa et al. 2003, Lira et al. 2007). As bird predation is associated with behavioral adaptation rather than venom potency, it is possible that the venom of *B.*

*insularis* has not evolved to be more potent to birds, but less potent to mammals, which are absent on the island (Zelanis et al. 2008, Marques 2021).

- Population density: the population of *B. insularis* is estimated to range between 2,400 and 2,900 individuals (Martins et al. 2008, Abrahão et al. 2021). It is the second highest snake density on the planet, falling behind Shedao Island, in China, which houses around 15,000 individuals of another viperid, *Gloydius shedaoensis* (Shine et al. 2002). This means that, while there are 55 snakes per hectare on Queimada Grande Island, there are 200 snakes per hectare on Shedao Island (Martins et al. 2008, Marques 2021).
- Species image and other species: only two snake species inhabit the island – *Bothrops insularis* (the most abundant one; Fig. 2a), and a snail-eater snake *Dipsas albifrons*, which is less frequently encountered (Cicchi et al. 2007, Marques 2021; pers. obs.; Fig. 2b). Therefore, any visual or textual content that did not correspond to the species represented in the figures in this study, or that suggested the presence of additional species beyond those documented, is incorrect.
- Queimada Grande Island info and image: Queimada Grande Island (Fig. 2c) is a 43-hectare island located approximately 35 km off the coast of São Paulo State, in Itanhaém Municipality, southeastern Brazil (Bataus & Reis 2011, Marques 2021). It is an Area of Relevant Ecological Interest (ARIE in Portuguese), a category of the Brazilian Sustainable Use Conservation Units (Brasil 1985, 2000). An ARIE is a small area, with limited or no human occupation, that comprises unique natural features and rare



**Figure 2.** *Bothrops insularis* (a); *Dipsas albifrons* (b); Queimada Grande Island (c). Photo (a) by Karina R. S. Banci, (b) by Otavio A. V. Marques, and (c) by João M. Rosa.

species of fauna and flora, and its main goal is to balance human activities and conservation in order to maintain local and regional ecosystems (Brasil 2000). The Chico Mendes Institute for Biodiversity Conservation (ICMBio in Portuguese) is the

authority responsible for monitoring and protecting Queimada Grande Island, and for controlling access, which is restricted exclusively to researchers and environmental agencies subject to prior authorization (Bataus & Reis 2011). Such measures were not implemented to protect occasional visitors, but to guarantee the conservation of the island and its inhabitants (Brasil 2000). Furthermore, contrary to what is often claimed in the news, a physician is not required to be present on trips to the island.

- Prey: *Bothrops insularis* exhibits an ontogenetic dietary shift, with juveniles primarily consuming ectothermic prey – such as centipedes, lizards, and small anurans – while adults predominantly prey on small migratory birds, since many species of birds observed on the island either appear to have learned to avoid the snakes, as seen in small resident species, or they are too big to be preyed on by *B. insularis*, such as the brown boobies (*Sula leucogaster*; Marques et al. 2012). Brown boobies can grow up to 85 cm and have a wingspan up to 155 cm, and weigh over 1 kg (Fairbairn & Shine 1993, WikiAves 2023). Given their size, it is unlikely that a relatively small snake like *B. insularis* could prey on such large birds, or even their eggs, for which there are no known records. Although adult individuals of *B. insularis* might eventually feed on ectothermic prey and small resident birds, these snakes primarily prey on two small migratory birds: the Chilean elaenia (*Elaenia chilensis*) and the yellow-legged thrush (*Turdus flavipes*; Marques et al. 2012, Banci 2023). The Chilean elaenia makes a stopover on the island in mid-March during its post-breeding migration from southern to northern South America (Ruiz-Esparza et al. 2011). The yellow

legged-thrush arrives on the island in mid-July, coinciding with the fruiting period of the juçara palm (*Euterpe edulis*) in the coastal lowland Atlantic Forest at the beginning of the dry season (Montanhini 2010, Castro et al. 2012). This species migrates from high elevations to lowland areas to feed on the juçara palm fruits, and some individuals fly to the island when these fruits become scarce (Montanhini 2010, Castro et al. 2012, Marques 2021). These migratory events appear to influence stratum use by *B. insularis*, since these snakes are more frequently observed in the vegetation in March – due to the abundance of Chilean elaenias resting in the trees – and on the ground in July, because of the presence of yellow-legged thrushes feeding on fruits and insects on the ground (Marques et al. 2012, Marques 2021, Banci 2023).

- Habit: *Bothrops insularis* is a semi-arboreal species, and individuals can be found on the ground, as well as on the vegetation (Duarte et al. 1995, Martins et al. 2002, Marques et al. 2002a, b, 2012, Abrahão et al. 2021), including juveniles, which have been spotted both on the ground and using low vegetation strata (pers. obs.). An allometric relationship regarding vegetation use by *B. insularis* has been described before (Banci 2023), therefore, the larger individuals, that happen to be females because of the sexual dimorphism in this species, are encountered more frequently on the ground, whereas smaller and lighter individuals (frequently males) are observed in higher vegetation strata. The more pronounced use of vegetation by *B. insularis* than its mainland sister species, *B. jararaca* (Martins et al. 2002) is possibly responsible for some distinctive traits of the species,

such as longer and prehensile tail, slender body, and an anteriorly positioned heart to improve brain oxygenation during vertical locomotion on the vegetation (Lillywhite 1993, Martins et al. 2001, Wüster et al. 2005, Marques 2021).

- Morphology: as frequently observed in island snakes, *B. insularis* is smaller than its sister species from the mainland, *B. jararaca* (Boback 2003, Sawaya et al. 2023). Individuals of *B. insularis* usually attain less than 1 m, given that the largest male reported to date was 91.2 cm (Guimarães et al. 2010), and the largest female, 1.13 m (Banci 2023). This reduced body size could be related to prey size and availability (Boback 2003, Sawaya et al. 2023), considering that individuals feed on low calorie and/or infrequent prey, like small-sized birds and ectotherms (Marques et al. 2012, Banci 2023). Furthermore, its semi-arboreal habit may be associated with a reduced body size, in comparison to other *Bothrops* species, such as *B. jararaca*, which can grow up to 1.6 m (Martins et al. 2001, Campbell & Lamar 2004, Alencar et al. 2017). Moreover, as the name “golden lancehead” evidences, *B. insularis* has a golden coloration (Amaral 1921).
- Defense: *Bothrops insularis* is not considered an aggressive species, with defensive behaviors mostly based on immobility and escape strategies, given that retaliatory mechanisms are exceedingly rare in this species (Alves-Nunes et al. 2023, Banci et al. 2024).
- Predators: *Bothrops insularis* may be susceptible to predation by visiting birds of prey (Duarte et al. 1995). However, it is noteworthy that predation pressure at Queimada Grande Island is practically negligible, and this might have shaped the

defensive behavior of the species, which, as aforementioned, does not rely on aggressive displays, unlike *B. jararaca* (Banci et al. 2024).

- Activity: *Bothrops insularis* is a sister species of *B. jararaca*, the latter preying mainly on small mammals and eventually on birds (Sazima 1992), so these species share similar habits and diet (Sazima 1992, Martins et al. 2002, Graziotin et al. 2006). Nevertheless, due to lack of mammals on the island (Duarte et al. 1995), adults of *B. insularis* have adapted to feed predominantly on birds and, because of that, this adaptation has been associated with diurnal activity for several years (Amaral 1921, Hoge 1950). However, in spite of the feeding on birds happening during the day, *B. insularis* is intrinsically nocturnal, a common trait to several *Bothrops* species (Banci et al. 2025).
- Reproduction: *Bothrops insularis* is a viviparous species, a reproductive mode in which females give birth to live young instead of laying eggs (Almeida-Santos & Salomão 2002, Fenwick et al. 2012). Females are larger than males, a trait also observed in other *Bothrops* species (Amaral 1921, Sazima 1992, Nogueira et al. 2003, Marques et al. 2013). Interestingly, females of this species are intersexed and have hemipenes – typically reduced and morphologically distinct from those of males –, though their function, if any, remains unknown (Hoge et al. 1959, Marques et al. 2002b). Moreover, a true hermaphrodite individual was found in the 1950s, presenting ovaries, well-developed hemipenes and functional testes (Hoge et al. 1959). The mating season of *B. insularis* is from March to August, and females usually give birth to fewer than ten neonates (Marques et al. 2013). This lower

fecundity, in comparison to its sister species *B. jararaca* (up to 20 neonates), is possibly associated with the smaller maternal body size (Almeida-Santos 2005, Marques et al. 2013).

- Origin: current theories support that *B. insularis* originated from allopatric speciation caused by the formation of a geographic barrier, during the last Ice Age in the Quaternary period, 11,000 years ago (Marques 2002, Graziotin et al. 2006). As a result, populations of *B. jararaca* were isolated, resulting in the origin of *B. insularis* on Queimada Grande Island (Graziotin et al. 2006).
- Threats and market value: *Bothrops insularis* is a critically endangered species both nationally and globally, due to its restricted distribution and population decline over the years (Silveira et al. 2021). This decline may be caused by inbreeding (Salles-Oliveira et al. 2020) and illegal wildlife trade, where poachers visit the island without authorization to collect snakes to sell for up to US\$30,000 (Martins et al. 2008, Guimarães et al. 2014). Other possible threats include changes in bird migration patterns, parasites, and natural disasters (Abrahão et al. 2021).

## DISCUSSION

Our findings reveal that misinformation and sensationalism are frequently observed in digital content related to *Bothrops insularis* and Queimada Grande Island. Nearly 95% of the 230 sources analyzed contained misinformation, and almost 84% employed sensationalist language. The spread of misinformation appears to be strongly influenced by sensationalism, particularly through the use of emotionally

charged language, often invoking fear or disgust by carrying a negative connotation. This type of language contributes to the dissemination of misinformation, since it appeals to cognitive preferences, making emotionally provocative content more attractive and memorable to the public (Acerbi 2019). Venom and population density were the topics most affected by misinformation, as they tend to elicit emotional reactions, such as fear and fascination, among the general public. The media's tendency to portray *B. insularis* as a deadly venomous species or Queimada Grande Island as a dangerous place overrun by the most venomous snakes in the world is likely to be a strategy to capture public attention and maximize content visibility through sensationalism (Udeze & Uzuegbunam 2013, São Pedro 2020).

Although the majority of the sources lacked any reference to experts in the field, misinformation remained present in many of those that did mention expert consultation. This suggests either a misinterpretation or decontextualization of expert statements, or even the use of an expert to add legitimacy to the contents, despite the accuracy of the material. It is worth noting that, apart from being used in a sensationalist context, misinformation may also stem from outdated data found in early publications, as seen among the sources claiming that *B. insularis* venom is five times more toxic than that of *B. jararaca* (Duarte et al. 1995).

Our literature review highlights a clear disparity between scientific data and the information commonly disseminated online. For instance, in contrast to the widespread statements that *B. insularis* venom is many times more toxic than that of *B. jararaca*, or any other snake species, available data from scientific literature indicate that, although the venom exhibits unique characteristics, it

remains fundamentally similar to that of other *Bothrops* species, and is effectively neutralized by the standard bothropic antivenom (Barbosa et al. 2003, Zelanis et al. 2008). Similarly, while Queimada Grande Island is, indeed, one of the places with the highest known snake population densities, it is still far behind the density reported for Shedao Island (Shine et al. 2002, Martins et al. 2008). Moreover, numerous images of unrelated species and locations are often wrongly portrayed as *B. insularis* and Queimada Grande Island. These inaccuracies not only mislead the public but also contribute to the generation of fears and discrimination surrounding the snakes.

Unfortunately, this type of misconceptions is not unique to *B. insularis* or even to snakes in general. Other taxa, such as bats, sharks, and spiders are also common targets of myths, exaggerations, and cultural stigma (Prokop & Tunnicliffe 2008, Sabatier & Huveneers 2018, Mammola et al. 2020, Lu et al. 2021), which reinforces negative attitudes from the public and reduce conservation efforts towards these animals. As for snakes, these narratives often lead to fear-driven responses in people, including killing and engaging in risky interactions that increase the likelihood of snakebites, which can limit public support for conservation initiatives (Fernandes-Ferreira et al. 2011, Alves et al. 2012, 2014). In relation to *B. insularis*, such distortions are particularly concerning, as they may encourage illegal wildlife trade, and perpetuate misconceptions about the ecological significance and critical conservation status of the species.

In the age of digital media, these findings are very alarming, given that online content can reach vast audiences. The number of views of the YouTube videos that we encountered evidence this, with some of them showing millions of viewers. A clear example is a video

from the Mr. Beast channel, which alone had over 84 million views. Such viral content may also increase people's curiosity and interest in wildlife, which can eventually encourage the exploitation of snakes as pets, increasing the illegal commercialization, thereby directly impacting snake populations, especially rare species, which are already endangered (Ferreira & Barros 2020, Guynup et al. 2020, Martins & Fayet 2023). In addition, these practices may increase the number of wild animals kept in captivity, including exotic species, which, if released, either intentionally or accidentally, into natural habitats, may threaten native species (Ferreira & Barros 2020, Guynup et al. 2020, Martins & Fayet 2023).

According to some estimates, more than 38 million individuals of wild animals are removed from their natural habitats in Brazil to be sold illegally, 60% to be sold within the country and the rest to be exported to other countries (Wyatt et al. 2022). Furthermore, illegal wildlife trafficking corresponds to the third largest illegal activity in the world, generating between 8 and 21 billion dollars annually, considering that the price of each animal is directly proportional to its rareness (Scheffers et al. 2019). For instance, individuals of *B. insularis* are illegally sold for up to US\$ 30,000 (Martins et al. 2008). Considering the substantial number of sensationalist and biased contents online about *B. insularis*, combined with the fact that it is a rare endemic species, this makes it of considerable interest, potentially increasing its commercial value and encouraging biopiracy, threatening even more its conservation.

It must be emphasized that, as top predators, snakes play an important ecological role by controlling populations of their prey. For *B. insularis*, this role is amplified in the island's simplified food web, where limited functional redundancy makes population changes less

likely to be compensated by other species (Sanders et al. 2018). Furthermore, venomous snakes also have an immeasurable value for scientific research and bioprospection. For example, the toxins present in *B. jararaca* venom were used for developing Captopril, a medicine largely used for hypertension (Cushman & Ondetti 1991). In spite of *B. insularis* venom not being used for producing such medicine, as mentioned in some of the sources, the venom, in general, still shows high potential as an important source of molecules (Camargo et al. 2012), whose pharmacological properties will never be discovered if these snakes were to go extinct.

Fundamentally, our findings point out the responsibility of both media producers and scientists. From one perspective, digital media platforms and content creators should guarantee the factual accuracy of their content when addressing ecological or conservation-related topics, in order to avoid the spread of misinformation. Conversely, scientists and other experts must be more proactive in engaging with the public, either through awareness initiatives or by working closely with journalists and communicators, including digital content creators, to ensure accurate interpretation and contextualization of scientific data (São Pedro 2020). Our study also reinforces the importance of science communication, which is an essential strategy for making science more accessible, engaging, and comprehensible (Bueno 1985, Soares et al. 2024). *Bothrops insularis*, in turn, rather than being a villainized species, can serve as a representative example of the importance of valid ecological knowledge in promoting empathy and conservation interest, even for misunderstood animals.

Despite the extensive data, our study has limitations. The analysis was restricted to online sources in three languages, published up to the data collection period and focused only on Google News articles and YouTube videos, both of which already provided a considerable amount of data for investigation. Therefore, future research should expand the range of research sources to include social media platforms such as Facebook, Instagram, and TikTok, which may also hold a significant number of misleading contents about *B. insularis* and Queimada Grande Island, as well as about other snake species and wildlife in general. Understanding the magnitude of misinformation spread across different digital media platforms and how it shapes public attitudes toward biodiversity is essential to better address its consequences and guide effective conservation strategies.

In conclusion, our study provides a comprehensive overview of how misinformation on *B. insularis* and Queimada Grande Island is created and disseminated online. This problem is systemic and poses a real threat to conservation, science credibility, and public knowledge about biodiversity. To combat this issue, it is imperative that scientists, educators, content creators, authorities, and the society work together. Only through collective efforts we will be able to control the spread of misinformation and help the public understand the importance of protecting wildlife, particularly the critically endangered species.

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## REFERENCES

- ABRAHÃO CR, AMORIM LG, MAGALHÃES AM, AZEVEDO CR, GRISIFILHO JHH & DIAS RA. 2021. Extinction risk evaluation and population size estimation of *Bothrops insularis* (Serpentes: Viperidae), a critically endangered insular pitviper species of Brazil. *South Am J Herpetol* 19: 32-39.
- ACERBI A. 2019. Cognitive attraction and online misinformation. *Palgrave Commun* 5: 1-8.
- ALENCAR LRV, MARTINS M, BURIN G & QUENTAL TB. 2017. Arboreality constrains morphological evolution but not species diversification in vipers. *Proc R Soc B* 284: 1-9.
- ALLCOTT H & GENTZKOW M. 2017. Social Media and Fake News in the 2016 Election. *J Econ Perspect* 31: 211-236.
- ALMEIDA-SANTOS SM. 2005. Modelos Reprodutivos em Serpentes: Estocagem de Esperma e Placentação em *Crotalus durissus* e *Bothrops jararaca* (Serpentes: Viperidae). Doctoral Dissertation, Universidade de São Paulo, Brazil.
- ALMEIDA-SANTOS SM & SALOMÃO MG. 2002. Reproduction in Neotropical Pitvipers, with Emphasis on Species of the Genus *Bothrops*. In: Schuett GW, Höggren M, Douglas ME & Greene HW (Eds), *Biology of the Vipers*. Eagle Mountain: Eagle Mountain Publishing, USA, p. 445-462.
- ALVES RRN ET AL. 2014. Students' attitudes toward and knowledge about snakes in the semiarid region of Northeastern Brazil. *J Ethnobiol Ethnomed* 10: 1-8.
- ALVES RRN, VIEIRA KS, SANTANA GG, VIEIRA WLS, ALMEIDA WO, SOUTO WMS, MONTENEGRO PFGP & PEZZUTI JCB. 2012. A review on human attitudes towards reptiles in Brazil. *Environ Monit Assess* 184: 6877-6901.
- ALVES-NUNES JM, FELLONE A, SAZIMA I & MARQUES OAV. 2023. Overcoming the phantoms of the past: Influence of predatory stimuli on the antipredator behavior of island pitvipers. *PLoS One* 18: 1-18.
- AMARAL A. 1921. Contribuição para o conhecimento dos ofídios do Brasil. Parte II. Biologia de uma nova espécie, *Lachesis insularis*. *Mem Inst Butantan* 1: 39-44.
- ANDRADE DV, MARQUES OAV, GAVIRA RSB, BARBO FE, ZACARIOTTI R & SAZIMA I. 2010. Tail luring by the Golden Lancehead (*Bothrops insularis*), an island endemic snake from south-eastern Brazil. *South Am J Herpetol* 5: 175-180.
- BANCI KRS. 2023. História natural e ecologia da jararaca-ilhoa, *Bothrops insularis* (Serpentes, Viperidae). Doctoral Dissertation, Universidade Estadual Paulista, Brazil.
- BANCI KRS, ETEROVIC A, ROSA LGS & MARQUES OAV. 2025. Living in the dark side? Plastic activity in the *Bothrops jararaca* group (Serpentes, Viperidae). *Amphib Reptil* 1: 1-14.
- BANCI KRS, SIQUEIRA LHC, TORELLO-VIEIRA NF & MARQUES OAV. 2024. Differential predation pressure on island pit vipers shape their niches and defensive behavior. *Amphib Reptil* 1: 1-13.
- BARBO FE, BOOKER WW, DUARTE MR, CHALUPPE B, PORTES-JUNIOR JA, FRANCO FL & GRAZZIOTIN FG. 2022. Speciation process on Brazilian continental islands, with the description of a new insular lancehead of the genus *Bothrops* (Serpentes, Viperidae). *Syst Biodivers* 20: 1-25.
- BARBOSA AM, AMARAL RO, TEIXEIRA CFP, HYSLOP S & COGO JC. 2003. Pharmacological characterization of mouse hind paw oedema induced by *Bothrops insularis* (jararaca ilhoa) snake venom. *Toxicon* 42: 515-523.
- BATAUS YSL & REIS ML. 2011. Plano de ação nacional para a conservação da herpetofauna insular ameaçada de extinção. Brasília: ICMBio, 124 p.
- BOBACK SM. 2003. Body Size Evolution in Snakes: Evidence from Island Populations. *Copeia* 2003: 81-94.
- BRASIL. 1985. Decreto nº 91.887, de 05 de novembro de 1985. Declara como Área de Relevante Interesse Ecológico - ARIE as ilhas de Queimada Pequena e Queimada Grande, no litoral de São Paulo, e dá outras providências. Available at [https://www.gov.br/icmbio/pt-br/assuntos/biodiversidade/unidade-de-conservacao/unidades-de-biomas/marinho/lista-de-ucs/arie-ilhas-da-queimada-pequena-e-queimada-grande/arquivos/arie\\_queimada-grande.pdf](https://www.gov.br/icmbio/pt-br/assuntos/biodiversidade/unidade-de-conservacao/unidades-de-biomas/marinho/lista-de-ucs/arie-ilhas-da-queimada-pequena-e-queimada-grande/arquivos/arie_queimada-grande.pdf). Accessed on April 29<sup>th</sup> 2025.
- BRASIL. 2000. Lei Federal Nº 9.985, de 18 de julho de 2000. Regulamenta o art. 225, § 1º, incisos I, II, III e VII da Constituição Federal, institui o Sistema Nacional de Unidades de Conservação da Natureza e dá outras providências. Available at <http://www.planalto.gov.br/ccivil/leis/L9985.htm>. Accessed on April 29<sup>th</sup> 2025.
- BUENO WC. 1985. Jornalismo científico no Brasil: os compromissos de uma prática dependente. Tese de Doutorado, Universidade de São Paulo, Brazil.
- CALDERON LA ET AL. 2014. Antitumoral Activity of Snake Venom Proteins: New Trends in Cancer Therapy. *Biomed Res Int* 2014: 1-19.
- CAMARGO AC, IANZER D, GUERREIRO JR & SERRANO SM. 2012. Bradykinin-potentiating peptides: Beyond captopril. *Toxicon* 59: 516-523.
- CAMPBELL JA & LAMAR WW. 2004. The venomous reptiles of the Western Hemisphere (Volume 1), Ithaca: Cornell University Press, 475 p.
- CARRASCO PA, KOCH C, GRAZZIOTIN FG, VENEGAS PJ, CHAPARRO JC, SCROCCHI GJ, SALAZAR-VALENZUELA D, LEYNAUDA GC & MATTONI CI. 2023. Total-evidence phylogeny and evolutionary

morphology of New World pitvipers (Serpentes: Viperidae: Crotalinae). *Cladistics* 39: 71-100.

CASTRO ER, CORTÊS MC, NAVARRO L, GALETTI M & MORELLATO LPC. 2012. Temporal variation in the abundance of two species of thrushes in relation to fruiting phenology in the Atlantic rainforest. *Emu* 112: 137-148.

CGEE. 2023. Percepção da C&T. Available at <https://percepcao.cgee.org.br/percepcao-em-abientes-virtuais>. Accessed on February 24<sup>th</sup>, 2025.

CICCHI PJP, SENA MA, PECCININI-SEALE DM & DUARTE MR. 2007. Snakes from coastal islands of State of São Paulo, Southeastern Brazil. *Biota Neotrop* 7: 227-240.

CLINCHY M, ZANETTE LY, ROBERTS D, SURACI JP, BUESCHING CD, NEWMAN C & MACDONALD DW. 2016. Fear of the human “super predator” far exceeds the fear of large carnivores in a model mesocarnivore. *Behav Ecol* 27: 1826-1832.

CONRAD M, REIDER LB & LOBUE V. 2021. Exploring Parent-Child Conversations about Live Snakes and Spiders: Implications for the Development of Animal Fears. *Visit Stud* 24: 58-78.

COSENDEY BN & SALOMÃO SR. 2016. Mídia e educação: Os ofídios por trás das câmeras – répteis ou monstros? *REVEDUC* 10: 251-265.

CUSHMAN DW & ONDETTI MA. 1991. History of the design of captopril and related inhibitors of angiotensin converting enzyme. *Hypertension* 17: 589-592.

DELLA-CASA MS, JUNQUEIRA-DE-AZEVEDO I, BUTERA D, CLISSA PB, LOPES DS, SERRANO SMT, PIMENTA DC, MAGALHÃES GS, HO PL & MOURA-DA-SILVA AM. 2011. Insularin, a disintegrin from *Bothrops insularis* venom: inhibition of platelet aggregation and endothelial cell adhesion by the native and recombinant GST-insularin proteins. *Toxicon* 57: 125-133.

DUARTE MR, PUERTO G & FRANCO FL. 1995. A biological survey of the pitviper *Bothrops insularis* Amaral (Serpentes, Viperidae): An endemic and threatened offshore island snake of southeastern Brazil. *Stud Neotrop Fauna Environ* 30: 1-13.

EID E, AWAJI MA, NASARAT H & ALHIYASAT A. 2021. A Perceptions and Knowledge Towards Snakes: a Study from Jordan. *Herpetol Conserv Biol* 16: 345-354.

FAIRBAIRN J & SHINE R. 1993. Patterns of Sexual Size Dimorphism in Seabirds of the Southern Hemisphere. *Oikos* 68: 139-145.

FENWICK AM, GREENE HW & PARKINSON CL. 2012. The serpent and the egg: unidirectional evolution of reproductive mode in vipers? *J Zool Syst Evol Res* 50: 59-66.

FERNANDES-FERREIRA H, CRUZ RL, BORGES-NOJOSA DM & ALVES RRN. 2011. Crenças associadas a serpentes no estado do Ceará, Nordeste do Brasil. *Sitientibus* 11: 153-163.

FERREIRA BA, DECONTE SR, MOURA FBR, TOMIOSSO TC, CLISSA PB, ANDRADE SP & ARAÚJO FA. 2018. Inflammation, angiogenesis and fibrogenesis are differentially modulated by distinct domains of the snake venom metalloproteinase jararhagin. *Int J Biol Macromol* 119: 1179-1187.

FERREIRA JM & BARROS NM. 2020. O Tráfico de Fauna Silvestre no Brasil e seus Impactos. *Rev Direito Penal, Process Penal* 2: 76-100.

FORTI LR, TRAVASSOS MLO, CORONEL-BEJARANO D, MIRANDA DF, SOUZA D, SABINO J & SZABO JK. 2023. Posts Supporting Anti-Environmental Policy in Brazil are Shared More on Social Media. *Environ Manage* 71: 1188-1198.

FRANÇA FOS & MÁLAQUE CMSA. 2009. Acidente botrópico. In: Cardoso JLC et al. (Eds), *Animais Peçonhentos no Brasil - Biologia, Clínica e Terapêutica dos Acidentes*, São Paulo: SARVIER, São Paulo, Brasil, p. 81-95.

FREITAS MA. 2003. *Serpentes Brasileiras*, Salvador: Proquigel Química, 160 p.

GERBER DLJ, BURTON-JEANGROS C & DUBIED A. 2011. Animals in the media: New boundaries of risk? *Health Risk Soc* 13: 17-30.

GONÇALVES-MACHADO L ET AL. 2016. Combined venomomics, venom gland transcriptomics, bioactivities, and antivenomics of two *Bothrops jararaca* populations from geographic isolated regions within the Brazilian Atlantic rainforest. *J Proteomics* 135: 73-89.

GRAZZIOTIN FG, MONZEL M, ECHEVERRIGARAY S & BONATTO SL. 2006. Phylogeography of the *Bothrops jararaca* complex (Serpentes: Viperidae): past fragmentation and island colonization in the Brazilian Atlantic Forest. *Mol Ecol* 15: 3969-3982.

GUEDES TB, ENTIAUSPE-NETO OM & COSTA HC. 2023. Lista de répteis do Brasil: atualização de 2022. *Herpetol Bras* 12: 56-161.

GUIMARÃES MR, BOVO RP, KASPEROVICSUS KN & MARQUES OAV. 2010. *Bothrops insularis* (Golden Lancehead) Maximum Length. *Herpetol Rev* 41: 89.

GUIMARÃES MR, STEYER-MUNGUÍA R, DOHERTY PF JR, MARTINS M & SAWAYA RJ. 2014. Population Dynamics of the Critically Endangered Golden Lancehead Pitviper, *Bothrops insularis*: Stability or Decline? *PLoS One* 9: 1-7.

GUTIÉRREZ JM & LOMONTE B. 1995. Phospholipase A2 myotoxins from *Bothrops* snake venoms. *Toxicon* 33: 1405-1424.

- GUTIÉRREZ JM & RUCAVADO A. 2000. Snake venom metalloproteinases: Their role in the pathogenesis of local tissue damage. *Biochimie* 82: 841-850.
- GUYNUP S, SHEPHERD CR & SHEPHERD L. 2020. The True Costs of Wildlife Trafficking. *Geo J Int Aff* 21: 28-37.
- HAQ RU, ABDULABAD A, ASGHAR S & SZABO JK. 2023. Clicks and comments: Representation of wildlife crime in Pakistan in social media posts. *Glob Ecol Conserv* 43: 1-16.
- HEATWOLE H & DAVISON E. 1976. A Review of Caudal Luring in Snakes with Notes on Its Occurrence in the Saharan Sand Viper, *Cerastes vipera*. *Herpetologica* 32: 332-336.
- HOGUE AR. 1950. Notas Erpetológicas - 7. Fauna Erpetológica da Ilha da Queimada Grande. *Mem Inst Butantan* 22: 151-172.
- HOGUE AR, BELLUOMINI HE, SCHREIBER G & PENHA AM. 1959. Sexual abnormalities in *Bothrops insularis* (Amaral, 1921) (Serpentes). *Mem Inst Butantan* 29: 17-88.
- ISLAM ARMT, AKTAR ML, BINDAJAM AA, MALLICK J, MAMUN AA, PAL SC, SARKER MNI, RAHMAN MM & ALAM GMM. 2024. Attitudes and behaviors toward snakes in the snake charmer community: A case from northern Bangladesh. *Environ Dev Sustain* 26: 8065-8085.
- JANOVCOVÁ M, RÁDLOVÁ S, POLÁK J, SEDLÁČKOVÁ K, PELÉŠKOVÁ S, ŽAMPACHOVÁ B, FRYNTA D & LANDOVÁ E. 2019. Human Attitude toward Reptiles: A Relationship between Fear, Disgust, and Aesthetic Preferences. *Animals* 9: 238.
- KANG TS ET AL. 2011. Enzymatic toxins from snake venom: structural characterization and mechanism of catalysis *FEBS J* 278: 4544-4576.
- KLEIN A, CAPITANIO JS, DURVANEI AM & RUIZ IRG. 2011. Gene expression in SK-Mel-28 human melanoma cells treated with the snake venom jararhagin. *Toxicon* 57: 1-8.
- LANDOVÁ E, BAKHSHALIYEVA N, JANOVCOVÁ M, PELÉŠKOVÁ Š, SULEYMANOVA M, POLÁK J, GULIEV A & FRYNTA D. 2018. Association Between Fear and Beauty Evaluation of Snakes: Cross-Cultural Findings. *Front Psychol* 9: 333.
- LANGLEY RL. 2005. Animal-Related Fatalities in the United States – An Update. *Wilderness Environ Med* 16: 67-74.
- LILLYWHITE HB. 1993. Orthostatic intolerance of viperid snakes. *Physiol Zool* 66: 1000-1014.
- LIRA MS, FURTADO MF, MARTINS LMP, LOPES-FERREIRA M, SANTORO ML & BARBARO KC. 2007. Enzymatic and immunochemical characterization of *Bothrops insularis* venom and its neutralization by polyspecific *Bothrops* antivenom. *Toxicon* 49: 982-994.
- LU M, WANG X, YE H, WANG H, QIU S, ZHANG H, LIU Y, LUO J & FENG J. 2021. Does public fear that bats spread COVID-19 jeopardize bat conservation? *Biol Conserv* 254: 1-9.
- MADSEN T, UJVARI B, SHINE R & OLSSON M. 2006. Rain, rats and pythons: Climate-driven population dynamics of predators and prey in tropical Australia. *Austral Ecol* 31: 30-37.
- MAMMOLA S, NANNI V, PANTINI P & ISAIA M. 2020. Media framing of spiders may exacerbate arachnophobic sentiments. *People Nat* 2: 1145-1157.
- MARQUES OAV. 2021. A Ilha das Cobras: Biologia, evolução e conservação da jararaca-ilhoa na Queimada Grande. Cotia: Ponto A, Cotia, Brazil, 72 p.
- MARQUES OAV, ETEROVIC A & SAZIMA I. 2019. Serpentes da Mata Atlântica: Guia Ilustrado para as Florestas Costeiras do Brasil. Cotia: Ponto A, Cotia, Brazil, 319 p.
- MARQUES OAV, KASPEROVICZUS K & ALMEIDA-SANTOS SM. 2013. Reproductive Ecology of the Threatened Pitviper *Bothrops insularis* from Queimada Grande Island, Southeast Brazil. *J Herpetol* 47: 393-399.
- MARQUES OAV, MARTINS M, DEVELEY PF, MACARRÃO A & SAZIMA I. 2012. The golden lancehead *Bothrops insularis* (Serpentes: Viperidae) relies on two seasonally plentiful bird species visiting its island habitat. *J Nat Hist* 46: 885-895.
- MARQUES OAV, MARTINS M & SAZIMA I. 2002a. A new insular species of pitviper from Brazil, with comments on evolutionary biology and conservation of the *Bothrops jararaca* group (Serpentes, Viperidae). *Herpetologica* 58: 303-312.
- MARQUES OAV, MARTINS M & SAZIMA I. 2002b. A jararaca da Ilha da Queimada Grande, *Ciência Hoje* 31: 56-59.
- MARTINS M, ARAUJO MS, SAWAYA RJ & NUNES R. 2001. Diversity and evolution of macrohabitat use, body size and morphology in a monophyletic group of Neotropical pitvipers (*Bothrops*). *J Zool* 254: 529-538.
- MARTINS M, MARQUES OAV & SAZIMA I. 2002. Ecological and phylogenetic correlates of feeding habits in Neotropical pitvipers (genus *Bothrops*). In: Schuett GW, Höggren M, Douglas ME & Greene HW (Eds), *Biology of the Vipers*, Eagle Mountain: Eagle Mountain Publishing, Eagle Mountain, USA, p. 307-328.
- MARTINS M, SAWAYA RJ & MARQUES OAV. 2008. A first estimate of the population size of the critically endangered lancehead, *Bothrops insularis*. *South Am J Herpetol* 3: 168-174.

- MARTINS RG & FAYET FA. 2023. Influência das Redes Sociais e o Delito Tráfico de Animais. CICCRIM.
- MINEKA S & ÖHMAN A. 2002. Phobias and Preparedness: The Selective, Automatic, and Encapsulated Nature of Fear. *Biol Psychiatry* 52: 927-937.
- MODESTO JCA, JUNQUEIRA-DE-AZEVEDO ILM, NEVES-FERREIRA AGC, FRITZEN M, OLIVA MLV, HO PL, PERALES J & CHUDZINSKI-TAVASSI AM. 2005. Insularinase A, a prothrombin activator from *Bothrops insularis* venom, is a metalloprotease derived from a gene encoding protease and disintegrin domains. *Biol Chem* 386: 589-600.
- MONTANHINI AM. 2010. Avifauna da Ilha Queimada Grande, SP: Diversidade, estrutura trófica e sazonalidade. Master's Thesis, Universidade Estadual Paulista, Brazil. (Unpublished).
- MOTA FPB & CILENTO I. 2020. Competence for internet use: Integrating knowledge, skills, and attitudes. *Comput Educ Open* 1: 1-10.
- NANNI V, CAPRIO E, BOMBIERI G, SCHIAPARELLI S, CHIORRI C, MAMMOLA S, PEDRINI P & PENTERIANI V. 2020. Social Media and Large Carnivores: Sharing Biased News on Attacks on Humans. *Front Ecol Evol* 8: 71.
- NOGUEIRA C, SAWAYA RJ & MARTINS M. 2003. Ecology of *Bothrops moojeni* (Serpentes: Viperidae: Crotalinae) in the Brazilian Cerrado. *J Herpetol* 37: 653-659.
- NOGUEIRA CC ET AL. 2019. Atlas of Brazilian Snakes: Verified Point-Localities Maps to Mitigate the Wallacean Shortfall in a Megadiverse Snake Fauna. *South Am J Herpetol* 14: 1-274.
- ÖHMAN A, FLYKT A & ESTEVES F. 2001. Emotion Drives Attention: Detecting the Snake in the Grass. *J Exp Psychol Gen* 130: 466-478.
- ÖHMAN A & MINEKA S. 2003. The Malicious Serpent: Snakes as a Prototypical Stimulus for an Evolved Module of Fear. *Curr Dir Psychol Sci* 12: 5-9.
- OLIVEIRA TM. 2020. Como enfrentar a desinformação científica? Desafios sociais, políticos e jurídicos intensificados no contexto da pandemia. *Liinc* 16: 1-23.
- ONYISHI IE, NWONYI SK, PAZDA A & PROKOP P. 2021. Attitudes and Behaviour toward snakes on the part of Igbo people in southeastern Nigeria. *Sci Total Environ* 763: 1-8.
- PAHO - PAN AMERICAN HEALTH ORGANIZATION. 2020. Understanding the infodemic and misinformation in the fight against COVID-19. Available at [https://iris.paho.org/bitstream/handle/10665.2/52052/Factsheet-infodemic\\_eng.pdf](https://iris.paho.org/bitstream/handle/10665.2/52052/Factsheet-infodemic_eng.pdf). Accessed on June 18<sup>th</sup> 2024.
- POLÁK J, RÁDLOVÁ S, JANOVCOVÁ M, FLEGR J, LANDOVÁ E & FRYNTA D. 2020. Scary and nasty beasts: Self-reported fear and disgust of common phobic animals. *Br J Psychol* 111: 297-321.
- PROKOP P & TUNNICLIFFE SD. 2008. "Disgusting" Animals: Primary School Children's Attitudes and Myths of Bats and Spiders. *EURASIA J Math Sci Tech Ed* 4: 87-97.
- RIPOLL L & MATOS JCM. 2017. Zumbificação da informação: a desinformação e o caos informacional. *RBBB* 13: 2334-2349.
- RUIZ-ESPARZA J, ROCHA PA, RUIZ-ESPARZA DPB, RIBEIRO AS & FERRARI SF. 2011. Migratory Birds in the Semi-arid Caatinga Scrublands of Northeastern Brazil: Diversity and Seasonal Patterns. *Ornitol Neotrop* 22: 15-24.
- SABATIER E & HUVENEERS C. 2018. Changes in Media Portrayal of Human-Wildlife Conflict during Successive Fatal Shark Bites. *Conserv Soc* 16: 338-350.
- SALLES-OLIVEIRA I, MACHADO T, BANCÍ KRS, ALMEIDA-SANTOS SM, SILVA MJJ. 2020. Genetic variability, management, and conservation implications of the critically endangered Brazilian pitviper *Bothrops insularis*. *Ecol Evol* 10: 12870-12882.
- SANDERS D, THÉBAULT E, KEHOEA R & VEENA FJFV. 2018. Trophic redundancy reduces vulnerability to extinction cascades. *PNAS* 115: 2419-2424.
- SÃO PEDRO VA. 2020. Snake News: uma breve análise da cobertura da mídia digital sobre serpentes no Brasil. *Herpetol Bras* 9: 114-123.
- SAWAYA RJ, BARBO FE, GRAZZIOTIN FG, MARQUES OAV & MARTINS M. 2023. Lanceheads in Land-Bridge Islands of Brazil: Repeated and Parallel Evolution of Dwarf Pitvipers. In: Lillywhite HB & Martins M (Eds), *Islands and Snakes: Diversity and Conservation*, New York: Oxford University Press, New York, USA, p. 67-80.
- SAZIMA I. 1992. Natural history of the jararaca pitviper, *Bothrops jararaca*, in southeastern Brazil. In: CAMPBELL JA & BRODIE ED JR. (Eds), *Biology of the Pitvipers*, Texas: Selva Press, Texas, USA, p. 199-216.
- SCHEFFERS BR, OLIVEIRA BF, LAMB I & EDWARDS DP. 2019. Global wildlife trade across the tree of life. *Science* 366: 71-76.
- SHINE R, SUN L, KEARNEY M & FITZGERALD M. 2002. Thermal correlates of foraging-site selection by Chinese pitvipers (*Gloydia shedoensis*, Viperidae). *J Therm Biol* 27: 405-412.
- SHU K, WANG S, LEE D, LIU H. 2020. Mining Disinformation and Fake News: Concepts, Methods, and Recent

Advancements. In: Shu K, Wang S, Lee D & Liu H (Eds), *Disinformation, Misinformation, and Fake News in Social Media*, Cham: Springer, Cham, Switzerland, p. 1-19.

SILVA AFF & BRINGEL LLCC. 2024. Como o poder da mídia na sociedade influencia a livre manifestação do pensamento. *EGAL* 1: 1-16.

SILVEIRA AL ET AL. 2021. *Bothrops insularis*. The IUCN Red List of Threatened Species. Available at <https://www.iucnredlist.org/species/2917/123180264>. Accessed on August 2<sup>nd</sup> 2025.

SOARES TR, MARASCHIN AA, SCAGLIONI CG, ARAÚJO RR & DORNELES P. 2024. Divulgação científica: conceitos, aproximações, diferenças e relação com feiras de ciências. *REM* 8: 390-407.

STANLEY JW. 2008. Snakes: Objects of Religion, Fear, and Myth. *J Integr Biol* 2: 42-58.

UDEZE S & UZUEGBUNAM CE. 2013. Sensationalism in the media: the right to sell or the right to tell. *J Commun Media Res* 5: 69-78.

UETZ P. 2025. The Reptile Database. Available at <http://www.reptile-database.org>. Accessed on July 22<sup>nd</sup> 2025.

VIZOTTO LD. 2003. *Serpentes: lendas, mitos, superstições e crendices*. São Paulo: Plêiade, São Paulo, Brazil, 240 p.

WIKIAVES. 2023. Atobá-pardo (*Sula leucogaster*). WikiAves, a Enciclopédia das Aves do Brasil. Available at <https://www.wikiaves.com.br/wiki/atoba-pardo>. Accessed on February 25<sup>th</sup> 2025.

WHO - WORLD HEALTH ORGANIZATION. 2024. Infodemic. Available at [https://www.who.int/health-topics/infodemic#tab=tab\\_1](https://www.who.int/health-topics/infodemic#tab=tab_1). Accessed on June 18<sup>th</sup> 2024.

WÜSTER W, DUARTE MR & SALOMÃO MG. 2005. Morphological correlates of incipient arboreality and ornithophagy in island pitvipers, and the phylogenetic position of *Bothrops insularis*. *J Zool* 266: 1-10.

WYATT T, MIRALLES O, MASSÉ F, LIMA R, COSTA TV & GIOVANINI D. 2022. Wildlife trafficking via social media in Brazil. *Biol Conserv* 265: 1-4.

ZELANIS A, TRAVAGLIA-CARDOSO SR & FURTADO MFD. 2008. Ontogenetic changes in the venom of *Bothrops insularis* (Serpentes: Viperidae) and its biological implication. *South Am J Herpetol* 3: 43-50.

ZIAKIS C, VLACHOPOULOU M, KYRKOUDIS T & KARAGKIOZIDOU M. 2019. Important Factors for Improving Google Search Rank. *Future Internet* 11: 32.

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**Author contributions**

WBB conducted the research, collected and analyzed the data, and wrote the manuscript. KRSB co-supervised the study, helped to conduct the research, collected and analyzed the data, wrote and revised the manuscript. OAVM conceived the idea, supervised the study, and revised the

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**Data availability**

The data underlying this study are available in the article and its online Supplementary Material, openly available on GitHub at <https://github.com/wilianbarbosa/Herpetological-misinformation-sup-mat>. These data were derived from sources in the public domain.

