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First documented record of *Kinosternon scorpioides* (Chelonia: Kinosternidae) in the state of Piauí, Northeastern Brazil

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Primeiro registro documentado de *Kinosternon scorpioides* (Chelonia: Kinosternidae) no estado do Piauí, Nordeste do Brasil

Resumo: O presente trabalho fornece o primeiro registro documentado de *Kinosternon scorpioides* (Chelonia: Kinosternidae) no estado do Piauí e um mapa atualizado da distribuição geográfica da espécie na região Nordeste do Brasil. A espécie de ampla distribuição na América do Sul possui ainda grandes lacunas em sua distribuição geográfica. Dessa forma, o presente trabalho acrescenta dados importantes sobre a distribuição de *K. scorpioides*, especialmente na região nordeste, contribuindo para o conhecimento da biologia e conservação da espécie.

Palavras chave: Quelônio, distribuição geográfica, jurara, muçuã.

Abstract: Herein, I provide the first documented record of *Kinosternon scorpioides* (Chelonia: Kinosternidae) in the state of Piauí and an updated geographic distribution map of the species in Northeastern Brazil. This species of wide distribution in South America still has large gaps in its geographic distribution. Thus, I add important data on the actual distribution of *K. scorpioides*, especially in the Brazilian Northeastern region, contributing to the knowledge of the biology and conservation of this species.

Key words: Chelonian, geographic distribution, jurara, muçuã.

The turtle clade Kinosternidae is exclusive to the Americas (Iverson 1992) and consists of small to medium sized species of mud and musk turtles, widely distributed from southern Canada to northern Argentina (Turtle Taxonomy Working Group 2014). Two monophyletic subfamilies are recognized: Kinosterninae, which includes the genera *Kinosternon* and *Sternotherus*, and Staurotypinae, including the genera *Staurotypus* and *Claudius* (Iverson 1998). *Kinosternon* Spix, 1824 is the largest genus in the family and the most widely distributed throughout America, currently composed of 20 species (Iverson 1992; Uetz *et al.* 2019). Of these species, only one is found in Brazil: *Kinosternon scorpioides* (Linnaeus, 1766).

The scorpion mud turtle *K. scorpioides*, popularly known as muçuã or jurara, is a medium-sized chelonian (about 18 to 27 cm length), occur in aquatic temporary, permanent and semi-permanent habitats (Berry & Iverson 2011), being also able to develop a semi-aquatic behavior (Pritchard & Trebbau 1984). This species, characterized by its relatively high oval and narrow carapace, with presence of three dorsal longitudinal keels (Vinke & Vinke 2001), has great ecological tolerance and it can be found in natural and anthropogenic water bodies (Rueda-Almonacid *et al.* 2007; Vogt 2008).

Despite its extensive area of occurrence in Brazil in different biomes (Amazon, Caatinga, Cerrado, Pantanal and Coastal Zone) of the Northern, Northeastern and Midwestern regions (Iverson 1992; Cabrera & Colantonio 1997; Costa *et al.* 2010; Silveira *et al.* 2011; Moura *et al.* 2014; Tomas *et al.* 2015), there are still large sample gaps (Silveira *et al.* 2011), including in the Brazilian Northeastern. The Turtle Taxonomy Working Group (2014) cites the occurrence of this species in all states of Brazilian Northeastern, however, there is no documented record of localities or vouchers (Silveira *et al.* 2011). Documented records of *K. scorpioides* occurrence in Brazilian Northeastern are found for the states of Alagoas, Bahia, Ceará, Maranhão, Paraíba, Pernambuco and Rio Grande do Norte (e.g. Cabrera & Colantonio 1997; Berry & Iverson 2011; Moura *et al.* 2014), being Pernambuco the state with the largest number of records (Moura *et al.* 2014) indicating a homogeneous distribution throughout the state. In other states the records are punctual or located in relatively small areas.

To date, there is no record of occurrence of the species for the states of Piauí and Sergipe. Herein, I present the first documented record of *K. scorpioides* for the state of Piauí and a geographical distribution map of this species for the Northeastern region of Brazil, filling distribution gap between the Maranhão and Ceará states.

The specimen of *K. scorpioides* (**Figure 1**) was registered in the municipality of Pedro II, located in the northern region of the state of Piauí. An adult male (18.2 cm length of carapace) was accidentally found crossing an asphalted avenue near the Campus of the Federal Institute of Education, Science and Technology of Piauí - IFPI (04°26'59.44" S, 41°27'22.14" W) on July 4, 2019. The individual, collected to avoid its running over, was transported to the Biochemistry Laboratory of the IFPI for identification by the team of the Biodiversity and Biotechnology Research Group of Piauí North-Center – BIOTECPI. The individual was measured, photographed and released near to the Capivara River (04°32'49.97" S, 41°19'33.48" W), located about 17.8 km from the collection site. The images were cataloged in the Biological Collection of the Federal Institute of Education, Science and Technology of Piauí - IFPI Campus Pedro II (CBPII 094-095).

The local where the individual was found is situated on the periphery of the municipality, an area still little urbanized that has shrub vegetation and formation of temporary small ponds during the rainy season (December to May). However, the area has been suffering constant deforestation for implementation of a residential project. The municipality of Pedro II is located in the Serra dos Matões, approximately 600 m above sea level, and inserted in the Environment Protection Area Serra da Ibiapaba (Brasil 1996). Pedro II is inserted in a semiarid region with transitional vegetation between the Cerrado and Caatinga (Barros *et al.* 2014) and has a dry and moderate climate compared to others municipalities of Piauí (Milanez & Puppim 2009). In addition, the municipality has a large amount of perennial and temporary aquatic environments, such as the Joana weir, located about 2 km from the collection site, Pirapora River Waterfall, Capivara River, Urubu-Rei Waterfall, Salto Liso Waterfall, which justifies the occurrence this species in the region.

The species identification was based on the key provided by Iverson (1992) and description of Berry & Iverson (2011), having as criteria the carapace with three longitudinal keels, plastron with two well-developed hinges, the anterior hinge located between the epiplastron and hyoplastron and the posterior hinge between hyoplastron and xiphiplastron, besides the presence of an horny spine on the prehensile tail tip, characteristics in which differentiates the species from all other Brazilian turtles species. This work corresponds the first record of *K. scorpioides* for the state of Piauí and fills a distribution gap between the Serra da Ibiapaba region, extreme west of the state of Ceará, and the northern region of the state of Maranhão (**Figure 2**). Localities of Northeastern Brazil with registration of the species are shown in **Table 1**.

Although the conservation status of *K. scorpioides* is considered as least concern (LC) (Berry & Iverson 2011; Vogt *et al.* 2015), there is no accurate estimate of the species population dynamics in the wild (Carvalho Jr. *et al.* 2010). In addition, natural populations have been decreasing significantly in recent decades due to illegally hunt, since the

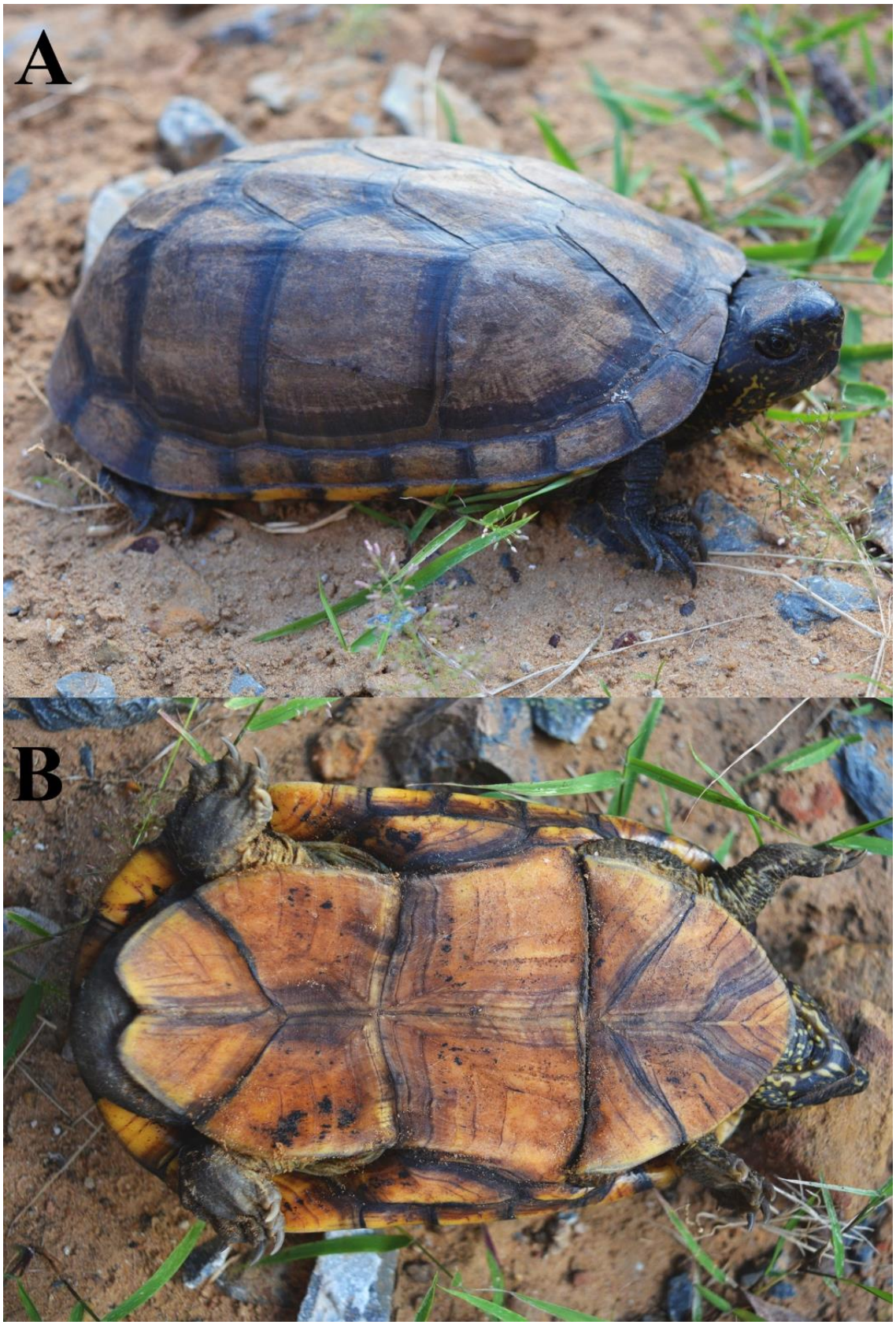

Figure 1. Adult male of *Kinosternon scorpioides* recorded in the municipality of Pedro II, state of Piauí, Northeastern Brazil: **A**. Dorsal view (CBPII 094); **B**. Ventral view (CBPII 095). Photo: Etielle Barroso Andrade.

species is widely appreciated in the traditional cuisine of the Brazilian Northern and Northeastern regions (Smith 1979; Vogt 2008; Alves *et al.* 2012) and used for medicinal purposes

(Alves *et al.* 2012), for example to cure heart conditions (Leender 2001). Thus, the present work adds important data about real distribution of *K. scorpioides*, in the Northeastern Brazil, contributing to biology and conservation knowledge of the species. In addition, future studies on population dynamics in the region are fundamental to determine the ecology and actual conservation status of the species in the state of Piauí.

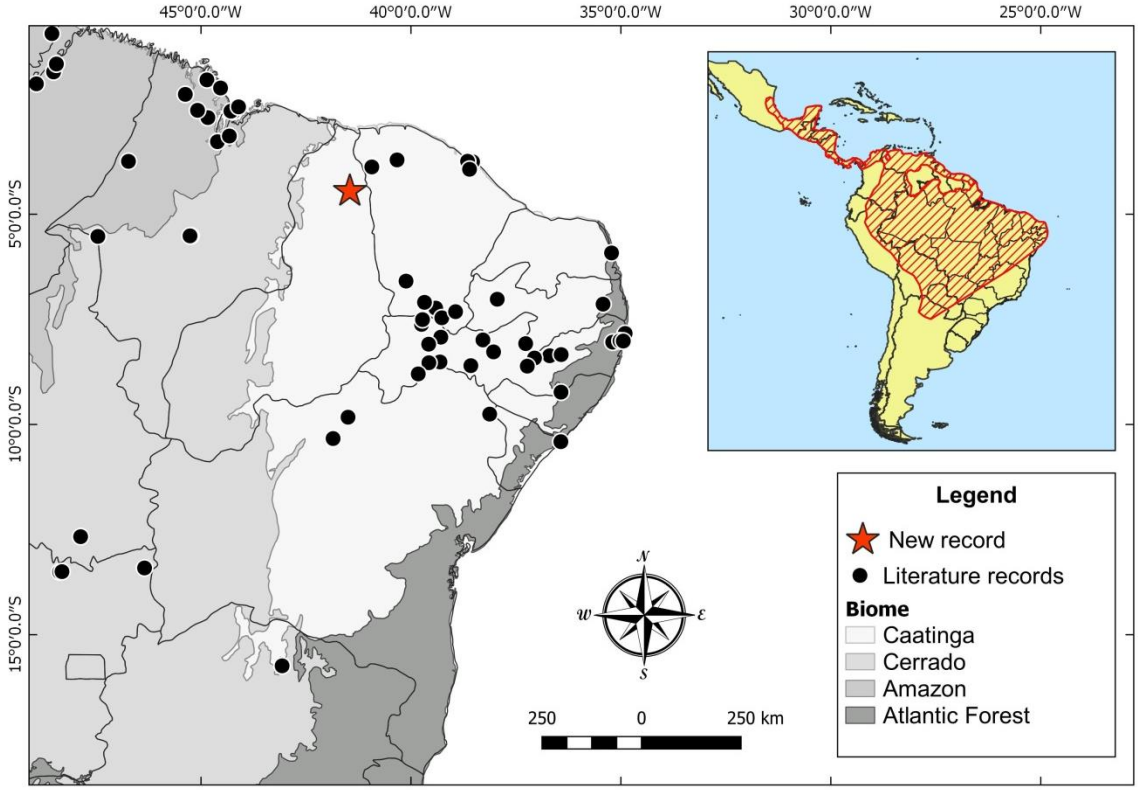

Figure 2. Geographic distribution map of *Kinosternon scorpioides* with new record in state of Piaui, Northeastern Brazil (red star) and literature data (black dots). The striped region represents the estimated species distribution (Turtle Taxonomy Working Group 2014).

Table 1. Localities of the Northeastern Brazil with *Kinosternon scorpioides* registration (– = information not available in consulted references).

State	Municipality	Latitude (S)	Longitude (W)	Reference
Alagoas	Piaçabuçu	10°24'26.29"	36°25'52.85"	Santos *et al.* (2008); Moura *et al.* (2014).
	–	–	–	Rodrigues (2005); Moura (2006); Moura *et al.* (2014).
Bahia	Santa Brígida	09°44'00.00"	38°08'00.00"	Santos *et al.* (2008); Moura *et al.* (2014).
	Sento Sé	10°19'00.00"	41°50'00.00"	Santos *et al.* (2008); Moura *et al.* (2014).
	–	–	–	Moura *et al.* (2014).
Ceará	Aiuaba	06°35'58.10"	40°07'20.50"	Costa *et al.* (2018).
	Caucaia	03°44'00.46"	38°39'36.54"	Rocha (1948); Ribeiro *et al.* (2015); Roberto & Loebmann (2016).
	Crato	–	–	Rocha (1948); Vanzolini *et al.* (1980); Ribeiro *et al.* (2015); Roberto & Loebmann (2016).
	Fortaleza	03°44'43.76"	38°34'29.81"	Rocha (1948); Rodrigues & Borges-Nojosa (2013); Ribeiro *et al.* (2015); Roberto & Loebmann (2016).
	Milagres	07°18'55.80"	38°56'18.33"	Rocha (1948); Ribeiro *et al.* (2015); Roberto & Loebmann (2016).
	Nova Olinda	07°05'37.90"	39°40'42.66"	Rocha (1948); Ribeiro *et al.* (2015); Roberto & Loebmann (2016); Pereira *et al.* (2018).
	Pacatuba	03°55'46.60"	38°36'20.90"	Rocha (1948); Ribeiro *et al.* (2015); Roberto & Loebmann (2016).

Table 1. Continuation.

State	Municipality	Latitude (S)	Longitude (W)	References
	Planalto da Ibiapaba	03°20'00.00"	40°42'00.00"	Rocha (1948); Loebmann & Haddad (2010); Moura *et al.* (2014); Ribeiro *et al.* (2015); Roberto & Loebmann (2016).
	–	–	–	Lima-Verde & Cascon (1990); Moura *et al.* (2014).
Maranhão	São Bento	02°42'05.36"	44°50'13.89"	Pereira *et al.* (2007); Barreto *et al.* (2010); Viana *et al.* (2013, 2014, 2015); Moura *et al.* (2014).
	Anajatuba	03°15'45.90"	44°36'35.70"	Aragão *et al.* (2018).
	Barra do Corda	05°30'35.92"	45°15'04.29"	Vanzolini (1956-58); Cabrera & Colantonio (1997).
	Cedral	01°59'54.24"	44°32'06.38"	Barreto *et al.* (2010).
	Ilha de Cururupu	–	–	Barreto *et al.* (2010).
	Imperatriz	05°31'32.00"	47°28'37.00"	Viana *et al.* (2015).
	Pinheiro	02°31'31.65"	45°04'58.58"	Barreto *et al.* (2010).
	Raposa	02°25'31.00"	44°04'04.00"	Barreto *et al.* (2009); Moura *et al.* (2014).
	Reserva Biológica Gurupi	03°58'32.00"	46°46'52.00"	Freitas *et al.* (2017).
	Santa Rita	03°08'55.97"	44°19'30.19"	Pereira *et al.* (2005).
	São Luís	02°32'52.92"	44°17'17.77"	Chaves *et al.* (2012).
	Turilândia	02°08'55.48"	45°22'28.23"	Barreto *et al.* (2010).
Paraíba	Coremas	–	–	Cabrera & Colantonio (1997).
	Gurinhém	–	–	Cabrera & Colantonio (1997).
Pernambuco	Arcoverde	08°25'06.24"	37°03'30.60"	Freitas *et al.* (2019).
	Belo Jardim	08°20'11.40"	36°25'24.60"	Freitas *et al.* (2019).
	Betânia	08°18'00.00"	38°11'00.00"	Moura *et al.* (2012, 2014).
	Cabrobó	08°44'00.00"	39°42'00.00"	Moura *et al.* (2012, 2014).
	Exu	–	–	Cabrera & Colantonio (1997).
	Floresta	08°28'00.00"	38°28'00.00"	Borges-Nojosa & Santos (2005); Moura *et al.* (2014).
	Igarassu	07°50'00.00"	35°00'00.00"	Moura *et al.* (2012, 2014).
	Orocó	08°28'00.00"	39°41'00.00"	Moura *et al.* (2014).
	Parnamirim	08°09'00.00"	39°33'00.00"	Moura *et al.* (2014).
	Parque Nacional do Catimbau	08°35'34.57"	37°14'51.24"	Pedrosa *et al.* (2015).
	Pesqueira	08°16'00.00"	36°37'00.00"	Moura *et al.* (2012, 2014).
	Recife	08°00'52.17"	34°56'38.84"	Melo *et al.* (2018).
	Santa Maria da Boa Vista	08°47'44.92"	39°49'40.82"	Moura *et al.* (2014).
	São Lourenço da Mata	08°07'00.00"	34°60'00.00"	Santos (2009); Moura *et al.* (2012, 2014).
	Serra Talhada	07°59'22.40"	38°16'58.79"	Moura *et al.* (2014).
	Serrita	07°55'51.94"	39°17'08.28"	Pereira *et al.* (2015).
	–	–	–	Vanzolini (1994); Santos *et al.* (2008).
Piauí	Pedro II	04°26'59.44"	41°27'22.14"	Present study.
Rio Grande do Norte	–	–	–	Iverson (1992); Berry & Iverson (2011).

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