

Preliminary checklist of dragonflies (Insecta: Odonata) of the Santa Catarina State, Brazil

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Abstract: In this study, we provide a checklist of the species of Odonata (Insecta) from the state of Santa Catarina (southern Brazil), along with their location records in the municipalities across the state (whenever possible). We compiled 147 species from 60 genera and nine families, making Santa Catarina the second state with the most Odonata species recorded in southern Brazil. The families with the highest number of species were Libellulidae (54 species from 18 genera), followed by Coenagrionidae (36 species from 17 genera), Gomphidae (20 species from ten genera) and Aeshnidae (15 species from eight genera). Several regions of Santa Catarina are unexplored (mostly the westernmost and central regions of the state), whereas the knowledge in the southern coast and the subtropical highland grasslands remains restricted to sparse occurrence records. Moreover, the distribution records in the state show an enormous historical track associated with the establishment of late entomologists in the region. Our study highlights the role of Atlantic Forest biome in maintaining high levels of diversity of Odonata species richness in Brazil and also shows that many areas in subtropical forests in Brazil are not adequately sampled.

Keywords: *Anisoptera; aquatic insects; Atlantic Forest; Inventory; Zygoptera.*

Checklist preliminar de libélulas (Insecta: Odonata) do Estado de Santa Catarina, Brasil

Resumo: Neste estudo, fornecemos um checklist das espécies de Odonata (Insecta) do estado de Santa Catarina (sul do Brasil), juntamente com seus registros de localização nos municípios do estado (quando disponíveis na literatura). Compilamos 147 espécies distribuídas em 60 gêneros e nove famílias, tornando Santa Catarina o segundo estado com mais espécies de Odonata registradas na região Sul do Brasil. As famílias com maior número de espécies foram Libellulidae (54 espécies distribuídas em 18 gêneros), seguida por Coenagrionidae (36 espécies distribuídas em 17 gêneros), Gomphidae (20 espécies distribuídas em dez gêneros) e Aeshnidae (15 espécies distribuídas em oito gêneros). Diversas regiões de Santa Catarina seguem inexploradas (principalmente as regiões centrais e do extremo oeste do estado), enquanto conhecimento no litoral sul e campos de altitude subtropicais permanecem restritos a registros pontuais de ocorrência. Além disso, os registros de distribuição no estado mostram um enorme legado histórico associado à fixação de entomologistas tradicionalmente lotados na região. Nosso estudo destaca o papel do bioma Mata Atlântica na manutenção de altos níveis de diversidade da riqueza de espécies de Odonata no Brasil e também mostra que muitas áreas de florestas subtropicais no Brasil não são amostradas adequadamente.

Palavras-chave: *Anisoptera; Insetos aquáticos; Inventário; Mata Atlântica; Zygoptera.*

Introduction

Odonata (dragonflies and damselflies) constitute a medium order of insects whose adults show terrestrial habits, whereas the large majority of their larval stages have aquatic habit. Odonata play important roles in freshwater ecosystems (May 2019). Given their generalist predatory habit in both larval and adult stages, they are key to the regulation of pest populations and mediation of community-level processes such as trophic cascades (Arnaud et al. 2022). To date, more than 6400 species of Odonata are recorded globally (Paulson et al. 2024), and the majority of the species is found in the Neotropics (Kalkman et al. 2008). In Brazil, the largest country in South America, more than 900 species of Odonata are recorded (Pinto 2024a). However, the knowledge about the Odonata diversity is

highly heterogeneous throughout the country (De Marco & Vianna 2005). Despite the increase of species descriptions and regional checklists (Costa et al. 2000, Rodrigues & Roque 2017, Costa & Oldrini 2005, Koroiva et al. 2021, 2020), the knowledge about the species occurrence and distribution is still unevenly distributed in Brazil, preventing accurate assessment of diversity as well as conservation policies (Cardoso et al. 2011).

In particular, the Southern region of Brazil (states of Paraná, Rio Grande do Sul and Santa Catarina) remains as one of the least studied in the country (Miguel et al. 2017), and the only state checklist of Odonata in the region is available for the state of Rio Grande do Sul (Dalzochio et al. 2018). The state of Santa Catarina is located in the Southern region of Brazil (Figure 1) has an area of 95,730.690 km², occupying 1.12%

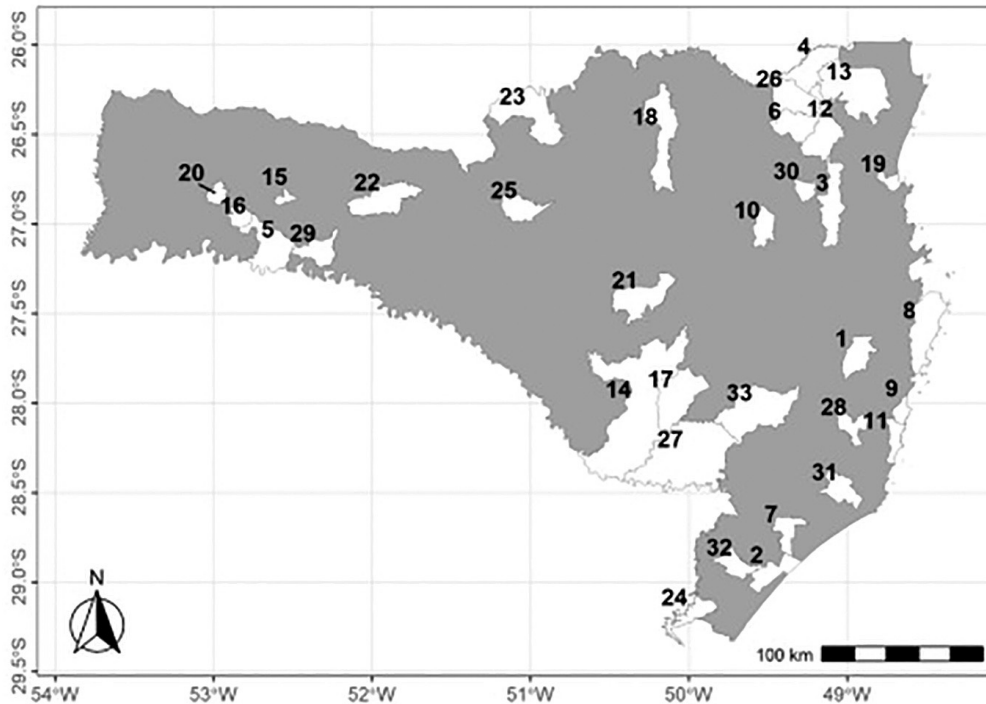


Figure 1. Municipalities in the state of Santa Catarina with known records of Odonata species. For code numbers, see Table S2.

of the Brazilian territory and the 19th position of territorial extension of Brazilian states; by 2022, the state population reached over 7.5 Mi people, currently among the ten states with highest population density in the country (IBGE 2022). The original vegetation type in the state is entirely situated within the range of the Atlantic Forest biome (IBGE 2019), a biome long considered a hotspot of biodiversity and as a priority for conservation (Brooks et al. 2006). Although Santa Catarina is the smallest state in the region, native forests cover 64% of the state territory, making SC the state with largest area of native vegetation in the Southern region of Brazil; nevertheless, trends of continuous loss of native vegetation are reported for the state over the 21st century (Projeto MapBiomias 2023).

With regards to the knowledge on the diversity of Odonata in Santa Catarina, the large majority of the studies focusing odonates in the state over the last 120 years encompass descriptions of new species, while the few ecological studies focused on larval stages of the order (Pires et al. 2020, Sieglösch et al. 2018, Turra et al. 2018), preventing species-level assessments. In fact, as most of the available information on the known diversity of Odonata in SC is fragmentary and dispersed across taxonomic keys without reference to their known locations across the municipalities of the state (Lencioni 2005, 2006, Heckman 2006, 2008), or taxon-specific synopsis (Table S1). Considering such knowledge gap, the main goal of this study is to provide a preliminary checklist of the species of Odonata recorded for the state of Santa Catarina through searches in the bibliography.

Material and Methods

1. Study area

The state of Santa Catarina (SC; geographical coordinates: 25° 57' 41" – 29° 23' 55" S; 48° 19' 37" – 53° 50' 00" W), is bordered by the states of Rio Grande do Sul (south) and Paraná (north), and by the

Province of Misiones (Argentina) to the west. The major relief units in SC include the lowlands in the coastal plain, the eastern (altitudes up to 400 m) and the western plateaus (mean altitudes ranging between 400–800 m covering fluvial depressions and plateaus, but also highland grassland plateaus located at altitudes >1,200 m) (Rocha 2016).

Across the state, annual precipitation ranges between 1,400–2,200 mm (Wrege et al. 2012). According to the Köppen classification system, the climate types in the state range from Cfa (humid subtropical with hot summers) in the coastal and plateaus areas (annual average temperatures ranging between 15–20 °C), while in the highland grassland plateaus, climate type is Cfb (humid subtropical with cool summers), with annual average temperature ranging between 12–15 °C (Alvares et al. 2013). Native vegetation typed in the state include Seasonal and Evergreen forests in the central and western regions, *restinga* in the Atlantic coast (Leão et al. 2014) and subtropical grasslands in the highland plateaus (Overbeck et al. 2024).

2. Data sources and elaboration of the list

To prepare the checklist, we compiled occurrence records of odonate species from a total number of 107 data sources. These data sources derived from a combination of procedures that included: screening of published and grey literature (items I and II); and consultation to databases of odonate species records (items III–V).

For literature screening, we assembled a list of (I) 101 publications (scientific articles, books and book sections) published between 1905 and 2023, after revising the reference list available in published catalogs of odonate species from Brazil (De Marco & Vianna 2005) and Neotropical region (Santos 1988) and regional checklists of odonate species for Brazilian states recently published in the journal (Dalzochio et al. 2018, Koroiva et al. 2021, 2020). (II) We also searched for

Table 1. List of odonate species recorded for the state of Santa Catarina, Brazil (and corresponding location). For references and municipalities codes, please check Tables S1 and S2. In cases the reference sources did not provide the location record, only the state is provided.

Suborder	Family	Species	Reference/location		
Anisoptera	Aeshnidae	<i>Anax concolor</i> Brauer, 1865	R27: Corupá, São Bento do Sul; R73: State only;		
		<i>Castoraeschna decurvata</i> Dunkle & Cook, 1984	R64: Blumenau; R67: Blumenau		
		<i>Castoraeschna januaria</i> (Hagen, 1867)	R22: Seara; R73: State only; R102: State only;		
		<i>Coryphaeschna adnexa</i> (Hagen, 1861)	R102: State only;		
		<i>Coryphaeschna perrensi</i> (McLachlan, 1887)	R22: Seara; R45: Joinville; R73: State only;		
		<i>Coryphaeschna viriditas</i> Calvert, 1952	R22: Seara		
		<i>Gynacantha bifida</i> Rambur, 1842	R56: State only; R73: State only;		
		<i>Limnetron antarcticum</i> Förster, 1907	R43: Seara; R104: Blumenau		
		<i>Limnetron debile</i> (Karsch, 1891)	R43: Seara		
		<i>Remartinia luteipennis</i> (Burmeister, 1839)	R17: Seara; R23: Seara; R64: Blumenau; R73: State only; R104: Morro dos Conventos, Seara		
		<i>Rhionaeschna bonariensis</i> (Rambur, 1842)	R63: Seara; R73: State only; R104: Jaraguá do Sul, Seara		
		<i>Rhionaeschna confusa</i> (Rambur, 1842)	R22: Seara; R63: Seara; R73: State only; R104: Seara		
		<i>Rhionaeschna planaltica</i> (Calvert, 1952)	R1: State only; R21: Seara; R22: Seara; R59: Seara; R63: Seara; R73: State only;		
		<i>Rhionaeschna punctata</i> (Martin, 1908)	R104: Seara, Jaraguá do Sul, Joinville, Blumenau		
		<i>Triacanthagyna nympha</i> (Navás, 1933)	R22: Jaraguá do Sul, Seara; R63: Seara; R73: State only; R85: São Joaquim, Urubici; R104: Seara, Jaraguá do Sul		
		Corduliidae		<i>Navicordulia aemulatrix</i> Pinto & Lamas, 2010	R14: Blumenau; R62: Blumenau, Joinville; R104: Blumenau, Joinville
				<i>Navicordulia atlantica</i> Machado & Costa, 1995	R82: São Bento do Sul; R83: Timbó; R102: State only;
				<i>Neocordulia androgynis</i> (Selys, 1871)	R52: Joinville; R73: State only; R100: Joinville; R104: Joinville
				<i>Neocordulia santacatarinensis</i> Costa, Ravenello & Souza-Franco, 2008	R46: Paimel; R73: State only; R102: State only;
<i>Aphylla producta</i> Selys, 1854	R76: Ponte Serrada				
<i>Archaeogomphus densus</i> Belle, 1982	R48: Joinville; R102: State only;				
<i>Archaeogomphus globulus</i> Belle, 1994	R36: Seara; R102: State only;				
<i>Cyanogomphus waltheri</i> Selys, 1873	R50: Corupá; R73: State only; R102: State only;				
<i>Gomphoides praevia</i> St. Quentin, 1967	R16: Seara; R35: Seara; R70: Corupá; R73: State only; R94: Corupá; R102: State only;				
<i>Idiogomphoides demoulini</i> (St. Quentin, 1967)	R104: Corupá				
Gomphidae		<i>Phyllocycla pallida</i> Belle, 1970	R25: Seara; R28: Seara; R73: State only; R102: State only;		
		<i>Phyllocycla propinqua</i> Belle, 1972	R41: Ibirama; R70: Ibirama; R73: State only; R102: State only;		
		<i>Phyllocycla viridipleuris</i> (Calvert, 1909)	R28: Seara; R42: Seara; R73: State only; R102: State only;		
		<i>Phyllogomphoides annectens</i> (Selys, 1869)	R28: Seara; R42: Seara; R73: State only; R102: State only;		
			R16: Seara; R28: Seara; R42: Seara; R73: State only; R102: State only;		
			R28: Seara; R40: Seara; R104: Seara		

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Suborder	Family	Species	Reference/location
Anisoptera	Gomphidae	<i>Phyllogomphoides regularis</i> (Selys, 1873)	R28: Seara; R40: Seara; R73: State only; R102: State only;
		<i>Progomphus basistictus</i> Ris, 1911	R32: Seara; R73: State only;
		<i>Progomphus complicatus</i> Selys, 1854	R32: State only; R91: State only
		<i>Progomphus costalis</i> Hagen in Selys, 1854	R32: Lages; R104: Lages
		<i>Progomphus elegans</i> Belle, 1973	R32: Águas Mornas
		<i>Progomphus gracilis</i> Hagen in Selys, 1854	R106: State only;
		<i>Progomphus lepidus</i> Ris, 1911	R32: Seara; R73: State only; R104: Seara
		<i>Progomphus virginiae</i> Belle, 1973	R32: Seara; R73: State only;
		<i>Tibiagomphus uncutus</i> (Fraser, 1947)	R30: Seara; R35: Seara; R73: State only; R94: Seara; R102: State only; R104: Seara
		<i>Zonophora diversa</i> Belle, 1983	R39: Seara; R73: State only; R102: State only; R104: Seara
Libellulidae		<i>Brachymesia furcata</i> (Hagen, 1861)	R38: Florianópolis
		<i>Brechmorhoga nubecula</i> (Rambur, 1842)	R4: Águas Mornas; R9: Águas Mornas
		<i>Dasythemis mincki</i> (Karsch, 1890)	R6: Águas Mornas; R104: Seara
		<i>Dasythemis venosa</i> (Burmeister, 1839)	R9: Blumenau
		<i>Dythemis nigra</i> Martin, 1897	R9: State only; R12: State only
		<i>Dythemis sterilis</i> Hagen, 1861	R73: State only;
		<i>Erythemis atata</i> (Selys in Sagra, 1857)	R8: Águas Mornas; R88: São Bento do Sul; R102: State only;
		<i>Erythemis peruviana</i> (Rambur, 1842)	R103: Tubarão
		<i>Erythemis plebeja</i> (Burmeister, 1839)	R93: Blumenau; R103: Tubarão
		<i>Erythemis vesiculosa</i> (Fabricius, 1775)	R88: Itajaí; R93: Blumenau; R97: Florianópolis; R103: Joinville
		<i>Erythrodiplax anomala</i> (Brauer, 1865)	R18: State only; R38: Florianópolis
		<i>Erythrodiplax atroterminata</i> (Ris, 1911)	R18: State only; R29: State only; R102: State only; R104: Seara
		<i>Erythrodiplax castanea</i> (Burmeister, 1839)	R7: Águas Mornas; R18: Seara Águas Mornas; R73: State only;
		<i>Erythrodiplax chromoptera</i> Borror, 1942	R103: Imbituba
		<i>Erythrodiplax corallina</i> (Brauer, 1865)	R107: State only;
		<i>Erythrodiplax diversa</i> (Navás, 1916)	R11: State only; R73: State only; R104: State only
		<i>Erythrodiplax fusca</i> (Rambur, 1842)	R7: Águas Mornas; R18: Seara; R38: Florianópolis; R73: State only;
		<i>Erythrodiplax hyalina</i> Förster, 1907	R18: Seara Águas Mornas; R73: State only; R104: Seara
		<i>Erythrodiplax juliana</i> Ris, 1911	R7: Águas Mornas; R18: Águas Mornas; R104: Seara
		<i>Erythrodiplax media</i> Borror, 1942	R7: State only; R18: Blumenau, Seara, Águas Mornas; R29: State only; R73: State only;
		<i>Erythrodiplax melanorubra</i> Borror, 1942	R103: Araranguá; R104: Seara
			R18: Seara; R88: State only

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Suborder	Family	Species	Reference/location
Anisoptera	Libellulidae	<i>Erythrodiplax ochracea</i> (Burmeister, 1839)	R73: State only;
		<i>Erythrodiplax paraguayensis</i> (Förster, 1905)	R29: State only
		<i>Libellula herculea</i> Karsch, 1889	R2: Águas Mornas; R6: Águas Mornas; R88: Seara
		<i>Macrothemis heteronychia</i> (Calvert, 1909)	R70: Seara; R72: Seara; R104: Seara
		<i>Macrothemis imitans</i> Karsch, 1890	R9: Águas Mornas; R73: State only; R104: Seara
		<i>Macrothemis marmorata</i> Hagen, 1868	R9: Águas Mornas
		<i>Macrothemis musiva</i> Calvert, 1898	R9: Águas Mornas
		<i>Miathyria marcella</i> (Selys in Sagra, 1857)	R97: Florianópolis
		<i>Micrathyria catenata</i> Calvert, 1909	R61: Blumenau; R73: State only; R104: Blumenau
		<i>Micrathyria didyma</i> (Selys in Sagra, 1857)	R7: Águas Mornas
		<i>Micrathyria eximia</i> Kirby, 1897	R7: State only; R19: State only; R61: Ponte Alta do Sul
		<i>Micrathyria hesperis</i> Ris, 1911	R61: Ponte Alta do Sul; R73: State only;
		<i>Micrathyria hypodidyma</i> Calvert, 1906	R61: State only; R73: State only; R104: Seara
		<i>Micrathyria ocellata</i> Martin, 1897	R51: Blumenau; R61: State only; R73: State only; R103: Criciúma, Tubarão
		<i>Micrathyria stawiariskii</i> Santos, 1953	R51: Ponte Alta, Blumenau, Lages; R61: Lages, Ponte Alta; R73: State only; R104: Seara, Lages
		<i>Micrathyria unguolata</i> Förster, 1907	R7: Águas Mornas; R61: State only
		<i>Nephepeltia flavivrons</i> (Karsch, 1889)	R104: Papanduva
		<i>Nephepeltia phryne</i> (Perty, 1834)	R3: State only; R7: State only; R9: Blumenau; R92: Blumenau; R104: Blumenau
		<i>Orthemis ambinigrata</i> Calvert, 1909	R12: Blumenau; R20: Seara; R73: State only; R87: Blumenau, Seara; R104: Blumenau, Seara
		<i>Orthemis discolor</i> (Burmeister, 1839)	R38: Florianópolis; R83: Timbó; R103: Criciúma
		<i>Orthemis schmidti</i> Buchholz, 1950	R105: State only;
		<i>Pantala flavescens</i> (Fabricius, 1798)	R31: Balneário Piçarras; R102: State only; R103: Garopaba, Tubarão
		<i>Perithemis domitia</i> (Drury, 1773)	R6: State only; R9: Blumenau; R102: State only;
		<i>Perithemis icteroptera</i> (Selys in Sagra, 1857)	R9: Blumenau; R15: Blumenau; R73: State only; R102: State only; R103: Tubarão
		<i>Perithemis tenera</i> (Say, 1840)	R102: State only; R103: Tubarão
		<i>Rhodopygia cardinalis</i> (Erichson in Schomburgk, 1848)	R104: São Bento do Sul
		<i>Tramea abdominalis</i> (Rambur, 1842)	R10: State only; R102: State only;
		<i>Tramea binotata</i> (Rambur, 1842)	R37: Florianópolis
		<i>Tramea cophysa</i> Hagen, 1867	R37: Porto União, Corupá, Pinhal, Seara, São Bento do Sul; R102: State only; R103: Corupá, Florianópolis
		<i>Tramea darwini</i> Kirby, 1889	R37: Porto União, Corupá; R73: State only; R102: State only; R103: Corupá
		<i>Uracis ovipositorix</i> Calvert, 1909	R53: Rio das Antas; R73: State only;

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Suborder	Family	Species	Reference/location
Anisoptera	Libellulidae	<i>Zenithoptera anceps</i> Pujol-Luz, 1993	R47: São Francisco do Sul, Joinville; R54: São Francisco do Sul, Joinville
		<i>Zenithoptera lanei</i> Santos, 1941	R47: Rio das Antas; R54: Rio das Antas
Zygoptera	Calopterygidae	<i>Hetaerina cruentata</i> (Rambur, 1842)	R103: Joinville
		<i>Hetaerina hebe</i> Selys, 1853	R103: Joinville
		<i>Hetaerina longipes</i> Hagen in Selys, 1853	R5: State only; R44: São Bento do Sul; R65: State only; R79: State only; R81: Seara; R104: Seara, São Bento do Sul
		<i>Hetaerina mendezi</i> Jurzitza, 1982	R44: Seara; R65: State only; R79: State only; R103: Seara; R104: Seara
		<i>Hetaerina proxima</i> Selys, 1853	R103: Joinville
		<i>Mnesarete borchravii</i> (Selys, 1869)	R65: State only; R69: Blumenau, Joinville, São Bento do Sul; R79: State only; R81: Seara; R102: State only; R103: Joinville; R104: Blumenau, Joinville, São Bento do Sul
		<i>Mnesarete pruinoso</i> (Hagen in Selys, 1853)	R65: State only; R69: Seara; R79: State only; R81: Seara; R102: State only; R103: Seara; R104: Seara
		<i>Acanthagrion aepiolum</i> Tennessen, 2004	R26: Seara; R84: Seara
		<i>Acanthagrion ascendens</i> Calvert, 1906	R33: Seara; R79: State only; R84: Seara
		<i>Acanthagrion gracile</i> (Rambur, 1842)	R26: Seara; R84: Seara; R104: Blumenau, Seara
		<i>Acanthagrion lancea</i> Selys, 1873	R33: State only; R71: State only; R79: State only; R84: State only
		<i>Aceratobasis macilentata</i> (Rambur, 1842)	R72: Joinville; R75: Joinville; R81: Joinville; R102: State only; R103: Joinville; R104: Joinville
		<i>Argentagrion ambiguum</i> (Ris, 1904)	R77: Seara; R102: State only; R104: Seara
		<i>Argia albistigma</i> Hagen in Selys, 1865	R71: State only; R79: State only; R104: Seara, São Bento do Sul
		<i>Argia collata</i> Selys, 1865	R104: São Bento do Sul
		<i>Argia croceipennis</i> Selys, 1865	R78: Ponte Serrada; R79: State only; R104: Seara, São Bento do Sul, Águas Mornas
		<i>Argia cyathigera</i> Navás, 1934	R71: State only; R79: State only; R104: Seara
		<i>Argia fumigata</i> Hagen in Selys, 1865	R104: São Bento do Sul
		<i>Argia lilacina</i> Selys, 1865	R104: Seara
		<i>Argia modesta</i> Selys, 1865	R104: São Martinho, Campo Alegre
		<i>Argia serva</i> (Hagen in Selys, 1865)	R71: State only; R79: State only; R81: Seara; R104: São Martinho, Seara
		<i>Forcepsioneura haerteri</i> Machado, 2001	R60: Blumenau; R65: State only; R79: State only; R102: State only; R104: Blumenau
		<i>Forcepsioneura sancta</i> (Hagen in Selys, 1860)	R102: State only; R104: Seara
		<i>Fredyagrion andromache</i> (Hagen in Selys, 1876)	R104: Seara
		<i>Homeoura chelifera</i> (Selys, 1876)	R77: Seara; R102: State only; R104: Seara
		<i>Ischnura capreolus</i> (Hagen, 1861)	R102: State only
		<i>Ischnura fluviatilis</i> Selys, 1876	R104: Seara

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Odonata from Santa Catarina State (Brazil)

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Suborder	Family	Species	Reference/location
Zygoptera	Coenagrionidae	<i>Leptagrion macrurum</i> (Burmeister, 1839)	R57: Joinville; R66: Joinville; R71: State only; R79: State only; R81: Joinville; R104: Joinville, São Bento do Sul
		<i>Mecistogaster amalia</i> (Burmeister, 1839)	R81: Seara; R86: Blumenau, Joinville, São Bento do Sul; R95: Blumenau, Joinville; R103: Joinville; R104: Seara
		<i>Mecistogaster mielkei</i> Lacerda & Machado, 2019	R95: Joinville, Campo Alegre, São Bento do Sul; R102: State only
		<i>Minagrion mectogastrum</i> (Selys, 1976)	R71: State only; R79: State only; R96: Joinville
		<i>Nathaliagrion perlongum</i> (Calvert, 1909)	R57: Joinville; R71: State only; R79: State only; R99: State only; R103: Joinville
		<i>Neoneura confundens</i> Wässcher & Van't Bosch, 2013	R90: State only; R102: State only
		<i>Neoneura jurzitzi</i> Garrison, 1999	R55: Seara; R65: State only; R79: State only; R81: Seara; R104: Joinville
		<i>Neoneura leonardo</i> Machado, 2005	R68: Seara; R71: State only; R79: State only; R102: State only; R104: Joinville
		<i>Oxyagrion brevistigma</i> Selys, 1876	R71: State only; R79: State only; R102: State only
		<i>Oxyagrion hampeli</i> Calvert, 1909	R24: Seara; R34: Seara; R71: State only; R102: State only; R104: Seara
		<i>Oxyagrion simile</i> Costa, 1978	R102: State only; R103: Ponte Alta
		<i>Oxyagrion terminale</i> Selys, 1876	R34: Seara; R71: State only; R79: State only; R102: State only; R104: Seara
		<i>Peristicta aeneoviridis</i> Calvert, 1909	R85: Turvo, Lages, Blumenau, Lajeado Grande; R104: Seara
		<i>Telebasis carmesina</i> Calvert, 1909	R80: Seara; R81: Seara; R104: Seara
		<i>Telebasis filiola</i> (Perty, 1834)	R86: Joinville, São Bento do Sul
		<i>Telebasis theodori</i> (Navás, 1934)	R80: Seara, São Bento do Sul; R81: Seara; R103: São Bento do Sul; R104: Seara, São Bento do Sul
	Heteragrionidae	<i>Heteragrion lutzfelpei</i> Machado, 2006	R74: Joinville, Urubici; R81: Joinville, Seara; R89: Joinville, Seara; R101: Seara, Urubici; R103: Seara, Urubici; R104: Joinville, Seara, Urubici
		<i>Heteragrion triangulare</i> Hagen in Selys, 1862	R89: State only; R94: State only; R101: State only; R104: Seara
		<i>Archilestes exoletus</i> (Hagen in Selys, 1862)	R13: Águas Mornas; R79: State only; R104: Águas Mornas
		<i>Lestes auritus</i> Hagen in Selys, 1865	R65: State only; R79: State only; R98: Seara; R104: Seara
		<i>Lestes bipupillatus</i> Calvert, 1909	R49: Seara; R98: Seara; R103: Seara; R104: Seara
		<i>Lestes paulistus</i> Calvert, 1909	R49: Seara
		<i>Lestes pictus</i> Hagen in Selys, 1862	R49: Seara; R104: Seara
		<i>Lestes spatula</i> Fraser, 1946	R49: Seara
		<i>Lestes tricolor</i> Erichson, 1848	R65: State only; R79: State only; R98: State only; R104: Seara
	Megapodagrionidae	<i>Allopodagrion brachyurum</i> De Marmels, 2001	R58: Seara; R65: State only; R79: State only; R81: Seara; R104: Seara
		<i>Allopodagrion contortum</i> (Hagen in Selys, 1862)	R58: São Bento do Sul; R65: State only; R79: State only; R103: Florianópolis; R104: São Bento do Sul

records in doctoral thesis and master dissertations specifically targeted on systematic and taxonomy of Neotropical odonate taxa; in each bibliographic source, we investigated the location of species records to cross-examine the occurrence of each species for the state.

Furthermore, we consulted the following online public and personal databases, as follows: (III) The Brazilian Fauna Taxonomic Catalog (“Catálogo Taxonômico da Fauna do Brasil”; <http://fauna.jbrj.gov.br>) (Pinto 2024a); (IV) range distribution maps available at IUCN (International Union for Conservation of Nature) (IUCN 2023); and (V) personally updated versions of previously published databases (De Marco & Vianna 2005, Ellenrieder 2011) provided with the help of researchers and collaborators (see Acknowledgments) (Table S1).

We also gathered information about the municipalities where the species were collected, whenever available in the bibliographic records (Table S2; Figure 1). For the systematic classification, we followed the list all of the valid species of Odonata available in the World Odonata list website (Paulson et al. 2024).

We double-checked species records according to recent synopsis and reviews (Ellenrieder & Garrison 2003, Vilela et al. 2023, Lencioni 2022) and species synonymies for specific genera, as follows: for the genus *Navicordulia* Machado & Costa, 1995 (Corduliidae), *N. mielkei* and *N. miersi* are considered synonymies of *N. atlantica* Machado & Costa, 1995 (Pinto et al. 2022). For the genus *Perithemis* Hagen, 1861 (Libellulidae), we followed the synonymy proposed by Paulson (2020), which considers records of *P. mooma* Kirby, 1889 as *P. tenera* (Say, 1840). For the genus *Tramea* Hagen, 1861 (Libellulidae), *T. calverti* Muttkowski, 1910 is synonymized with *T. darwini* Kirby, 1889 (Lorenzo-Carballa et al. 2020). As for the genus *Orthemis* Hagen, 1861 (Libellulidae), we considered previous records of *O. ferruginea* (Fabricius, 1775) as *O. discolor* (Burmeister, 1839), as revised by recent cytogenetic studies (Mola et al. 2021) that attempt to solve the problematic status of species within this genus.

Results and Discussion

1. Species list

The total number of Odonata species recorded for the state of Santa Catarina is 147 (distributed in 60 genera and nine families; Table 1). The families with the highest number of species were Libellulidae (54 species from 18 genera) and Coenagrionidae (36 species from 17 genera), followed by Gomphidae (20 species from ten genera) and Aeshnidae (15 species from eight genera). The remaining families (Calopterygidae, Lestidae and Corduliidae) were represented by two genera each and nine, eight and four species, respectively; Heteragrionidae and Megapodagrionidae were represented by a single genus and two species each (Table 1). The species with the highest number of records in the state were *Rhionaeschna planaltica* (Calvert, 1952) and *R. punctata* (Martin, 1908) (Aeshnidae), *Erythrodiplax media* Borrer, 1942, *Tramea cophysa* Hagen, 1867 (Libellulidae), *Mnesarete borchgravii* (Selys, 1869) (Calopterygidae), *Mecistogaster amalia* (Burmeister, 1839) and *Peristicta aeneoviridis* Calvert, 1909 (Coenagrionidae), recorded in four locations (Table 1).

Some species cited by Heckman (2006) were only known for other regions of South America or Brazil and were not added to the final checklist to avoid mistakes. In specific, *Erythrodiplax connata*

(Burmeister, 1839) (Libellulidae) is thought to be confined Patagonia (western Argentina and Chile) (Paulson 2003), and records outside these countries are questionable (Lozano & Muzón 2020); *Micrathyria pseudhyppodidyma* Costa, Lourenço & Viera, 2002 (Libellulidae) is known to central and southeastern Brazil (states of Goiás and Rio de Janeiro, and Distrito Federal) (Costa et al. 2002), and is reported as vulnerable species in those regions (Ellenrieder 2009); *Zonophora campanulata* (Burmeister, 1839) (Gomphidae) encompasses a group of subspecies with allopatric distribution in central and southeastern Brazil (as stated in the original review and further studies on Brazilian Gomphidae), while only records of the sister clade (*Z. diversa* Belle, 1983) are valid to the state so far (Belle 1983, Almeida et al. 2013). Checklists for states in the Brazilian Amazon and regional inventories in central Brazil mention the occurrence of *Aphylla distinguenda* (Campion, 1920) (Gomphidae) and *Perithemis cornelia* (Say, 1840) (Libellulidae) in SC (Miranda Filho et al. 2022, Barbosa et al. 2019). Both species are known to central and northern Brazil and their corresponding sources do not mention their occurrence in Santa Catarina, most likely constituting erroneous records. *Heteragrion beschkii* Hagen in Selys, 1862 (Heteragrionidae) is cited as occurring in Santa Catarina based on personal records (Vilela & Guillermo-Ferreira 2021). However, recent synopsis on the genus do not confirm the occurrence of *H. beschkii* in SC (Vilela et al. 2023), and this species was thus not added to the final checklist.

Discussion

The 147 species listed for the state of Santa Catarina represent 16% of the known species of Odonata in Brazil (918 spp. (Pinto 2024a)). With the results presented in this study, the diversity of Odonata recorded for state of Santa Catarina is the second in number of species in the Southern region of Brazil, behind Rio Grande do Sul (184 species) (Dalzochio et al. 2018, Pires et al. 2019, Muzón & Lozano 2020), although no checklist for the state of Paraná has been published to date.

The total number of species recorded for the state of Santa Catarina is also lower than the diversity recorded for other states of the country, such as Minas Gerais (344 spp.) (Vilela 2023), São Paulo, 251 spp. (Costa et al. 2000), Mato Grosso do Sul, 198 spp. (Rodrigues & Roque 2017), Amazonas, 335 spp. (Koroiva et al. 2020). However, this result conveys rather important information both under zoogeographical and conservation perspectives which should be taken into consideration. The observed diversity of Odonata in SC corresponds to 80% of the number of species recorded for the neighboring state of Rio Grande do Sul (Dalzochio et al. 2018, Pires et al. 2019, Muzón & Lozano 2020), despite the area of SC being less than half of the latter (IBGE 2022). In fact, the number of odonate species recorded in SC is similar to the state of Espírito Santo (a subtropical state of similar area entirely situated within the Atlantic Forest; 180 species (Costa & Oldrini 2005). Considering the small area of the state of, our study highlights the prominent role of Atlantic Forest biome in maintaining high levels of diversity of Odonata species richness in Brazil and the Neotropics (Paulson 2006).

More than 50% of the species recorded in SC fall under the ‘LC category’ of conservation by IUCN (i.e., species with widespread distribution). This is likely because more than 80% of the species recorded in SC are shared with preserved areas of the state of Paraná

(Araujo & Pinto 2021), and Rio Grande do Sul (Dalzochio et al. 2018), as well as the Argentinian province of Misiones to the west (Lozano et al. 2020) also situated within the Atlantic Forest biome. So far, *Forcepsioneura haerteli* Machado, 2001 (Coenagrionidae) is the single species recorded in the state listed as ‘Endangered under criteria’, whereas nine species (Appendix 2) fall under the Data Deficient category (i.e., insufficient assessment). This includes the three species so far recorded only in the state (*Progomphus elegans* Belle, 1983 (Gomphidae), *Neocordulia santacarinensis* Costa, Ravello & Souza-Franco, 2008 and *Navicordulia atlantica* Machado & Costa, 1995 (Corduliidae)). In relation to the latter, *N. atlantica* was recently reviewed to encompass synonymies (Pinto et al. 2022) and lacks a thorough assessment of its conservation status.

Considering the municipal limits of the state, Seara municipality (western SC) stands out by far as the location with the most species recorded, followed by Joinville and Blumenau (Table 1). This remarkable pattern is largely due to the outstanding legacy of the late entomologist Fritz Plaumann (1902–1994), settled in (former Nova Teutonia, currently Seara) in the early decades of the 20th century (Lubenow 2017). The continuous sampling effort and wide network of scientific collaboration by Mr. Plaumann throughout the 20th century resulted in a long-standing rate of description of new insect species for the region, which ensured a continuous increase in the knowledge of the regional diversity (Silva 1998). Several regions of the state remain unexplored, mostly the central and westernmost areas of the state, near the border with Argentina (Figure 1). In addition, although several records are reported for the southern and eastern coast, the richer and more densely populated areas of the state, including the surroundings of Joinville and Florianópolis (the largest city and the state capital, respectively), many of these areas are under-sampled. This is because almost the entirety of the knowledge in the state is represented by species descriptions, and studies using systematic sampling of adult Odonata are basically non existing in the state. In fact, the known diversity of several odonate groups covering forest specialist taxa (Anisoptera species from many genera of Gomphidae and Aeshnidae; Zygoptera species from families Coenagrionidae and Heteragrionidae) is lower than in other states. In this context, the loss of several specimens stored in scientific collection of the Museu Nacional (MNRJ; Rio de Janeiro, Brazil), likely represented an important impediment for a deeper understanding of the Odonata diversity in the state, considering that many holotypes of the fauna of SC were stored at MNRJ.

Conclusion

Finally, the checklist of species of Odonata presented here poses a significant advance considering the previously unsystematic available literature for the state (Pinto 2024b, Heckman 2006, 2008), this number increases the species records for the state by 40%.

However, considering the scientific nature of this research (full recollection of secondary data), our list is to be considered only preliminary. We specifically refrained ourselves from including species records available at online databases and unreviewed by taxonomists. On this matter, we strongly recommend further review of records available at institutional repositories (e.g., museums and university collections) and public (e.g., GBIF, Splink) to tackle the shortfalls of biodiversity of Odonata in southern South America.

Supplementary Material

Table S1 - Codes for the bibliographic sources consulted for elaboration of the checklist of Odonata species from Santa Catarina state, Brazil.

Table S2 - List and codes for the municipalities (and corresponding locality names, when available) in Santa Catarina state where occurrence of species was recorded, as extracted from the literature.

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Author Contributions

Mateus M. Pires: contributed to data collection, visualization and manuscript preparation.

Eduardo Périco: supervised and coordinated several aspects of the project and participated in the review and editing of the manuscript.

Conflicts of Interest

The authors declare that they have no conflict of interest related to the publication of this manuscript.

Ethics

This study did not involve human beings and/or clinical trials that should be approved by one Institutional Committee.

Data Availability

Data used in this work were deposited in a permanent repository in accordance with the instructions for authors: <https://doi.org/10.48331/scielodata.YLYT3X>.

References

- ALMEIDA, M.V.O. de, PINTO, Â.P., CARVALHO, A. do L. & TAKIYA, D.M. 2013. When rare is just a matter of sampling: unexpected dominance of clubtail dragonflies (Odonata, Gomphidae) through different collecting methods at Parque Nacional da Serra do Cipó, Minas Gerais State, Brazil. *Rev. Bras. Entomol.* 57(4):417–423.
- ALVARES, C.A., STAPE, J.L., SENTELHAS, P.C., DE MORAES GONÇALVES, J.L. & SPAROVEK, G. 2013. Köppen’s climate classification map for Brazil. *Meteorol. Zeitschrift* 22(6):711–728.

- ARAÚJO, B.R. & PINTO, Â.P. 2021. Dragonflies (Insecta: Odonata) from Mananciais da Serra, a Tropical-Araucaria Forest ecotonal remnant in the southern Atlantic Forest, state of Paraná, Brazil. *Zoologia* 381–18.
- ARNAUD, S., KARI, K., LENIN, C., ANDRÉ, M., OLGA, P., JUSTIN, P., DAVID, B., NEDIM, T. & ROBBY, S. 2022. Odonata trophic ecology. In *Dragonflies and Damselflies* (A. Córdoba-Aguilar, C.D. Beatty, & J.T. Bried, eds) Oxford University Press/Oxford, Boston, MA, USA, p.219–232.
- BARBOSA, M.S., BORGES, L.R., DIOGO, D.S., VENÂNCIO, H. & SANTOS, J.C. 2019. Odonate Communities of the Sucupira Reservoir, Rio Uberabinha, Minas Gerais, Brazil. *Pap. Avulsos Zool.* 59e20195922.
- BELLE, J. 1983. A review of the genus *Zonophora* Selys (Odonata, Gomphidae). *Tijdschr. voor Entomol.* 126145–173.
- BROOKS, T.M., MITTERMEIER, R.A., DAFONSECA, G.A.B., GERLACH, J., HOFFMANN, M., LAMOREUX, J.F., MITTERMEIER, C.G., PILGRIM, J.D. & RODRIGUES, A.S.L. 2006. Global Biodiversity Conservation Priorities. *Science* (80-). 313(5783):58–61.
- CARDOSO, P., ERWIN, T.L., BORGES, P.A.V. & NEW, T.R. 2011. The seven impediments in invertebrate conservation and how to overcome them. *Biol. Conserv.* 144(11):2647–2655.
- COSTA, J.M., LOURENÇO, A.N. & VIEIRA, L.P. 2002. *Micrathyria pseudohypodidyma* sp. n. (Odonata: Libellulidae), com Chave das Espécies do Gênero que Ocorrem no Estado do Rio de Janeiro. *Neotrop. Entomol.* 31(3):377–389.
- COSTA, J.M., MACHADO, A.B.M., LENCIONI, F.A.A. & SANTOS, T.C. 2000. Diversidade e distribuição dos odonata (Insecta) no Estado de São Paulo, Brasil: Parte 1 - Lista das espécies e registros bibliográficos. *Publ. Avul. Mus. Nac.* 80(1):1–27.
- COSTA, J.M. & OLDRINI, B.B. 2005. Diversidade e distribuição dos Odonata (Insecta) no estado do Espírito Santo, Brasil. *Publicações Avulsas do Mus. Nac.* 1071–15.
- DALZUCHIO, M.S., RENNER, S., SGANZERLA, C., PRASS, G., ELY, G.J., SALVI, L.C., DAMETTO, N. & PÉRICO, E. 2018. Checklist of Odonata (Insecta) in the state of Rio Grande do Sul, Brazil with seven new records. *Biota Neotrop.* 18(4):e20180551.
- ELLENRIEDER, N. von. 2009. *Micrathyria pseudohypodidyma*. IUCN Red List Threat. Species 2009 e.T159112A5315873.
- ELLENRIEDER, N. von. 2011. Databasing dragonflies: State of knowledge in the Neotropical region. *Agrion* 13(1):1476–2552.
- ELLENRIEDER, N. von & GARRISON, R.W. 2003. A synopsis of the genus *Triacanthagyna* (Odonata: Aeshnidae). *Int. J. Odonatol.* 6(2):147–184.
- HECKMAN, C.W. 2006. *Encyclopedia of South American Aquatic Insects: Odonata – Anisoptera*. Springer Netherlands, Dordrecht.
- HECKMAN, C.W. 2008. *Encyclopedia of South American Aquatic Insects: Odonata – Zygoptera*. Springer Netherlands, Dordrecht.
- IBGE - INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA. 2019. *Biomass e sistema costeiro-carinho do Brasil: compatível com a escala 1:250.000*. Editora do IBGE, Rio de Janeiro.
- IBGE - INSTITUTO BRASILEIRO DE GEOGRAFIA E ESTATÍSTICA. 2022. *Cidades e Estados*.
- IUCN. 2023. *The IUCN Red List of Threatened Species*.
- KALKMAN, V.J., CLAUSNITZER, V., DIJKSTRA, K.D.B., ORR, A.G., PAULSON, D.R. & VAN TOL, J. 2008. Global diversity of dragonflies (Odonata) in freshwater. *Hydrobiologia* 595(1):351–363.
- KOROIVA, R., NEISS, U.G., FLECK, G. & HAMADA, N. 2020. Checklist of dragonflies and damselflies (Insecta: Odonata) of the Amazonas State, Brazil. *Biota Neotrop.* 20(1):1–18.
- KOROIVA, R., PEREIRA-COLAVITE, A., BATISTA, F.R. da C. & VILELA, D.S. 2021. Checklist and contribution to the knowledge of the odonatafauna of Paraíba state, Brazil. *Biota Neotrop.* 21(3):e20211196.
- LEÃO, T.C.C., FONSECA, C.R., PERES, C.A. & TABARELLI, M. 2014. Predicting extinction risk of Brazilian Atlantic Forest angiosperms. *Conserv. Biol.* 28(5):1349–1359.
- LENCIONI, F.A.A. 2005. *Damselflies of Brazil: An Illustrated Identification Guide – Non-Coenagrionidae Families*. All Print, São Paulo.
- LENCIONI, F.A.A. 2006. *The Damselflies of Brazil: An Illustrated Identification Guide 2 - Coenagrionidae*. All Print, São Paulo, Brazil.
- LENCIONI, F.A.A. 2022. Analysis of male *Leptagrion* Selys, 1876 sensu lato (Odonata: Coenagrionidae) with description of four new genera and a new species. *Zootaxa* 5105(1):63–104.
- LORENZO-CARBALLA, M., GARRISON, R., ENCALADA, A. & CORDERO-RIVERA, A. 2020. Darwin Returns to the Galapagos: Genetic and Morphological Analyses Confirm the Presence of *Tramea darwini* at the Archipelago (Odonata, Libellulidae). *Insects* 12(1):21.
- LOZANO, F. & MUZÓN, J. 2020. *Erythrodiplax connata*. IUCN Red List Threat. Species 2020 e.T103593974A103594277.
- LUBENOW, A.M. 2017. *UM Alemão em Santa Catarina: a coleção entomológica entomológica Fritz Plaumann*. *Museol. Interdiscip.* 5(9):109–119.
- DE MARCO, P. & VIANNA, D.M. 2005. Distribuição do esforço de coleta de Odonata no Brasil - Subsídios para escolha de áreas prioritárias para levantamentos faunísticos. *Lundiana* 6(SUPPL.):13–26.
- MAY, M.L. 2019. Odonata: Who they are and what they have done for us lately: Classification and ecosystem services of Dragonflies. *Insects* 10(3):.
- MIGUEL, T.B., CALVÃO, L.B., VITAL, M.V.C. & JUEN, L. 2017. A scientometric study of the order Odonata with special attention to Brazil. *Int. J. Odonatol.* 20(1):27–42.
- MIRANDA FILHO, J. da C., PENAGOS, C.C.M., CALVÃO, L.B., MIGUEL, T.B., BASTOS, R.C., FERREIRA, V.R.S., LIMA, D.V.M., VIEIRA, L.J.S., BRASIL, L.S. & JUEN, L. 2022. Checklist of Damselflies and Dragonflies (Odonata) from Acre state, and the first record of *Drepanoneura loutoni* von Ellenrieder & Garrison, 2008 for Brazil. *Biota Neotrop.* e20211320.
- MOLA, L.M., FOURASTIÉ, M.F. & AGOPIAN, S.S. 2021. High karyotypic variation in *Orthemis* Hagen, 1861 species, with insights about the neo-XY in *Orthemis ambinigra* Calvert, 1909 (Libellulidae, Odonata). *Comp. Cytogenet.* 15(4):355–374.
- MUZÓN, J. & LOZANO, F. 2020. *Negragrion sigma* gen.n. and sp.n. from South America with a morphological phylogeny of the New World *Ischnurinae* (Odonata: Zygoptera: Coenagrionidae). *An. Acad. Bras. Cienc.* 92(suppl 2): e20190025.
- OVERBECK, G.E., PILLAR, V.D.P., MÜLLER, S.C. & BENCKE, G.A. 2024. *South Brazilian Grasslands: Ecology and Conservation of the Campos Sulinos*. 1 ed. Springer International Publishing, Cham.
- PAULSON, D. 2003. Comments on the *Erythrodiplax connata* (Burmeister, 1839) group, with the elevation of *E. fusca* (Rambur, 1842), *E. minuscula* (Rambur, 1842), and *E. basifusca* (Calvert, 1895) to full species (Anisoptera: Libellulidae). *Bull. Am. Odonatol.* 6(4):101–110.
- PAULSON, D. 2006. The importance of forests to Neotropical dragonflies. In *Fourth WDA International Symposium of Odonatology* (A. Cordero-Rivera, ed.) Pensoft, Pontevedra, p.79–101.
- PAULSON, D. 2020. *Perithemis mooma* Kirby, 1889, is a synonym of *P. tenera* (Say, 1840). *Bull. Am. Odonatol.* 13(1):1–5.
- PAULSON, D., SCHORR, M., ABBOTT, J., BOTA-SIERRA, C., DELIRY, C., DIJKSTRA, K.D.B. & LOZANO, F. 2024. *World Odonata List*. OdonataCentral, Univ. Alabama.
- PINTO, Â.P. 2024a. Odonata Fabricius, 1793. In *Insetos do Brasil: Diversidade e Taxonomia* (J. A. Rafael, G. A. R. Melo, C. J. B. de Carvalho, S. Casari, & R. Constantino, eds) Editora INPA, Manaus, p.187–233.
- PINTO, Â.P. 2024b. Odonata in Santa Catarina. *Catálogo Taxonômico da Fauna do Bras.* PNUD.
- PINTO, Â.P., ALMEIDA, M.V.O. De & EHLERT, J. 2022. Three names, one species: junior synonyms for the Atlantic Forest emerald dragonfly *Navicordulia atlantica* (Odonata: Corduliidae s.s.). *Rev. Bras. Entomol.* 66(3):e20220052.

Odonata from Santa Catarina State (Brazil)

- PIRES, M.M., KOTZIAN, C.B., SGANZERLA, C., PRASS, G., DALZUCHIO, M.S. & PÉRICO, E. 2019. Diversity of Odonata (Insecta) in Seasonal Deciduous Forest fragments in southern Brazil (state of Rio Grande do Sul), with a new record for the state and comments on the seasonal distribution of the species. *Biota Neotrop.* 19(4):e20190769.
- PIRES, M.M., SIEGLOCH, A.E., HERNÁNDEZ, M.I.M. & PETRUCIO, M.M. 2020. Environmental drivers and composition of assemblages of immature odonates (Insecta) in a subtropical island in southern Brazil. *Acta Limnol. Bras.* 32e2.
- PROJETO MAPBIOMAS. 2023. Coleção 8 da Série Anual de Mapas de Uso e Cobertura da Terra do Brasil.
- ROCHA, I. de O. 2016. Atlas Geográfico de Santa Catarina. Diversidade da natureza – Fascículo 2. 2.ed ed. Editora da UDESC, Florianópolis.
- RODRIGUES, M.E. & ROQUE, F. de O. 2017. Checklist de Odonata do Estado de Mato Grosso do Sul, Brasil. *Iheringia. Série Zool.* 107(suppl):1–4.
- SANTOS, N.D. dos. 1988. Catálogo bibliográfico de ninfas de Odonatos Neotropicais. (Acompanhado de relação alfabética de autores e seus trabalhos). *Acta Amaz.* 18(1–2):265–350.
- SIEGLOCH, A.E., DA SILVA, A.L.L., DA SILVA, P.G. & HERNÁNDEZ, M.I.M. 2018. Local and regional effects structuring aquatic insect assemblages at multiple spatial scales in a Mainland-Island region of the Atlantic Forest. *Hydrobiologia* 805(1):61–73.
- SILVA, R.R. da. 1998. A coleção entomológica do Museu Fritz Plaumann. *Biotemas* 11(2):157–164.
- TURRA, B.L., RAIMUNDI, E.A. & SOUZA-FRANCO, G.M. de. 2018. Influência de variáveis ambientais em ambientes lóticos de mata de araucária sobre a taxocenose odonata. *Rev. Ibero-Americana Ciências Ambient.* 9(3):289–305.
- VILELA, D.S. 2023. Libélulas de Minas Gerais.
- VILELA, D.S. & GUILLERMO-FERREIRA, R. 2021. *Heteragrion beschkii*. he IUCN Red List Threat. Species e.T125302037A125329078.
- VILELA, D.S., LENCIONI, F.A.A., BOTA-SIERRA, C.A., WARE, J.L. & BISPO, P.C. 2023. Taxonomic revision of the Neotropical genus *Heteragrion* Selys, 1862 (Zygoptera: Heteragrionidae): male morphology, new species and illustrated key. *Zootaxa* 5356(1):1–96.
- WREGE, M.S., STEINMETZ, S., REISSER JÚNIOR, C., ALMEIDA, I.R. de & EMPRESA BRASILEIRA DE PESQUISA AGROPECUÁRIA. 2012. Atlas climático da Região Sul do Brasil : estados do Paraná, Santa Catarina e Rio Grande do Sul. Second ed. Embrapa Clima Temperado, Pelotas.

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