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Untangling Odonata diversity in Neotropical region through DNA Barcoding

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Banca avaliadora

“And most of all, it can inspire a new generation of biologists to continue the quest that started, for me personally, 60 years ago: To search for life, to understand it and finally – above all – to preserve it. That is my wish. Thank you.” Edward Osborne Wilson, My wish, March 2007, TED talk <http://www.ted.com/talks/e_o_wilson_on_saving_life_on_earth#t-90282>

Dedico esta tese a minha esposa Vanessa

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General abstract

Dragonflies (Insecta:Odonata) are an order of insects that contains over 6,000 described species over 30 families. This taxon is recognized for presenting a great phenotypic diversity, effective capacity to be ecological indicators and act as umbrella group for freshwater biodiversity conservation. Although odonates have a large number of species with sequences deposited in public databases, genetic information of Neotropical species is still scarce. This scenario leads the need for more studies that can investigate and provide molecular data for this taxonomic group, allowing the use of molecular tools in species delimitation and specimen identification in Neotropical dragonflies. In this sense, this thesis with five chapters evaluate, construct and analyze molecular data of dragonflies, with special focus to Neotropical species, the DNA Barcode approach (Folmer COI sequences) and its application to ecological studies. Information generated in this thesis increased by almost 50% the number of species with deposited sequences present in South America. The use of the DNA barcode method for specimen identification of Neotropical odonates was considered efficient. Using this approach, I obtained a reliable identification for more than 90% of the specimens collected in one of the most diverse regions in Brazil. Moreover, through the evaluation of the barcode gap in a global dataset, it was possible to verify that little more than 15% of the odonatan species of the world can not be separated with this technique. The results of this thesis have direct implications in biodiversity fields such as taxonomy (e.g. limitations to use the cox1 gene for specimen identification in a global scale), evolution (e.g. low intraspecific variation value in *Argia* species) and biomonitoring of Neotropical species. (e.g. ability to identify specimens with the COI gene in this region). Obviously, enhancement of local databases is necessary, but the evidence of usability of DNA Barcode is of fundamental importance for future scientific

and financial efforts ought to be developed and implemented accordingly. In this context, the development of studies and databases regarding DNA Barcode for Neotropical dragonflies should be considered as a promising tool of wide and immediate application for this taxon.

Resumo geral

Libélulas (Insecta: Odonata) são uma ordem de insetos que contém mais de 6.000 espécies descritas em mais de 30 famílias. Este táxon é reconhecido por apresentar uma grande diversidade fenotípica, capacidade efetiva de ser indicadores ecológicos e atuar como grupo guarda-chuva para a conservação da biodiversidade de água doce. Embora as libélulas tenham um grande número de espécies com sequências depositadas em bancos de dados públicos, a informação genética das espécies neotropicais ainda é escassa. Este cenário leva à necessidade de mais estudos que possam investigar e fornecer dados moleculares para este grupo taxonômico, permitindo o uso de ferramentas moleculares na delimitação de espécies e na identificação de espécimes em libélulas neotropicais. Neste sentido, esta tese com cinco capítulos avalia, constrói e analisa dados moleculares de libélulas, com foco especial em espécies neotropicais, abordagem de código de barras de DNA ("*DNA Barcoding*") e sua aplicação em estudos ecológicos. As informações geradas nesta tese aumentaram em quase 50% o número de espécies com sequências depositadas presentes na América do Sul. O uso do método de código de barras do DNA para a identificação de espécimes de libélulas neotropicais foi considerado eficiente. Com essa abordagem, obtive uma identificação confiável para mais de 90% dos espécimes coletados em uma das regiões mais diversas do Brasil. Além disso, através da avaliação do "*barcoding gap*" em um conjunto de dados global, foi possível verificar que pouco mais de 15% das espécies das libélulas do mundo não podem ser separadas com esta técnica. Os resultados desta tese têm implicações diretas em campos de biodiversidade, como taxonomia (e.g. limitações do uso do gene COI (citocromo oxidase subunidade I) para a identificação de espécimes em escala global), evolução (e.g. baixo valor de variação intraespecífica em espécies de *Argia*) e monitorização de espécies neotropicais. (e.g. capacidade de identificar espécimes com o

gene COI). Obviamente, o aprimoramento de bases de dados locais é necessário, mas a evidência de usabilidade do código de barras de DNA é de fundamental importância para os futuros esforços científicos e financeiros que devem ser desenvolvidos e implementados em conformidade. Neste contexto, o desenvolvimento de estudos e bases de dados sobre código de barras de DNA para libélulas neotropicais deve ser considerado como uma ferramenta promissora de aplicação ampla e imediata para este táxon.

General introduction

Starting with the origin of species concept by Linnaeus, there has been much debate with respect to the definition of the word “species”. As listed by Hey (2001), there are more than 20 different definitions that have developed over many aspects of science but are also related to philosophical questions. Despite the appearance of disagreements regarding the term, contemporary biologists seem to have accepted the hypothesis that species are segments of population-level evolutionary lineages (De Queiroz 1998).

At the end of 1990's, de Queiroz (1998, 1999), using a “Unified Species Concept”, which is a synthesis that relaxes the rivalry among different species concepts and fosters multidisciplinary reasoning (Dejaco et al. 2016), suggested an analysis of multiple criteria to perform species delimitation. Along this line of thinking, the hypothesis that a specimen belongs to particular species must involve the concept of metapopulation lineage as the only necessary property of species and properties acquired by lineages as relevant factors to assessing lineage separation (De Queiroz 2007). The operation of this concept followed the use of the so-called “Integrative taxonomy”, an approach for defining species that uses multiple and complementary perspectives (Dayrat 2005). From this point of view, the traditional morphological delimitation of species is now a “hypothesis that should be tested through different approaches and with different kinds of data” (Dayrat 2005) and should include ecological and molecular evidence.

Contemporaneously with this approach, in 2003, Hebert et al. (2003a) suggested the DNA barcode methodology as a new form of specimen identification and help for cryptic species discovery. The DNA barcode is a molecular diagnostic tool for specimen identification and constitutes an approach that involves sequencing of DNA amplicons

from standardized regions and then comparing these sequences to a reference database (Hebert et al. 2003a, b). For animal studies, Hebert et al. (2003a) suggested the use of a 658 bp fragment of the cytochrome c oxidase I gene (COI), the mitochondrial protein-coding gene marker with high interspecific variation and low intraspecific genetic divergence. These authors, assuming that intra- and inter-specific comparisons do not overlap ("barcode gap"), also defined a 2% pairwise distance threshold for species delimitation. Although subsequent studies have demonstrated the absence of a barcoding gap for many groups (e.g. Wiemers & Fiedler 2007, Kvist 2016) when the threshold is well-established, simple delimitation methods have been advantageous for quickly and easily assessing potential biodiversity (Young et al. 2017). Even knowing that the primary focus of DNA barcode applications is describing and documenting diversity, current barcoding data has the potential to fulfill delimitation tasks from many fields such as forensic science, veterinary and agricultural surveillance, and environmental studies (see Valentini et al. 2009).

As evidenced by Hortal et al. (2015), the ecology field has undergone a significant revolution as a result of using molecular tools. The use of molecular markers (such as DNA barcoding) has allowed broad characterization of organisms, thus contributing to delimitation and demographic dynamics of species, analysis of clade divergence time, and large-scale recognition of interspecific interactions (Mandal et al. 2014). Species identification using exclusively morphological characters is often time-consuming, expensive, and too often relies on scarce taxonomic expertise gained only through years of training (Marshall et al. 2006). Current literature already includes several publications in which DNA barcoding was used to help understand biological diversity, especially in groups with difficult taxonomies such as invertebrates (e.g. the emblematic case of cryptic species in the Neotropical butterfly, *Astraptes fulgerator*

[Walch, 1775]; Hebert et al. 2004). Thus, molecular markers have proven to be of great potential for use in a wide variety of ecological and taxonomic applications, being a promising resource especially for non-taxonomists.

Considered an ideal platform for molecular and ecological studies, odonates, commonly known as dragonflies (Insecta: Odonata), have peculiar ecological characteristics such as the presence of stenotic species for habitat quality and a large number of previoulsy described molecular markers. This group also presents great phenotypic diversity and extraordinary genetic diversity at the species level (Hadrys et al. 2005, Watts et al. 2007), have an effective capacity to be ecological indicators (Rodrigues et al. 2016b, Miguel et al. 2017) and act as umbrella group for freshwater biodiversity conservation (Bried et al. 2007). Although there is a good level of taxonomic knowledge in adult odonates, larvae are still difficult to identify, which invariably limits their taxonomic resolution at lower levels (genus or family) and causes the loss of more refined information in aquatic environmental assessment (Valente-Neto et al. 2016). In an efficiency test between traditional and molecular methods for identification of odonates, Stein et al. (2014) found increased taxonomic resolution, suggesting that identification based on DNA barcoding has the potential to improve the power to detect stream conditions. Despite this potential, it is necessary to recognize that the full integration of barcode data in routine bioassessments and ecological studies is a challenge, especially because of the need for a robust reference database.

In order to increase the genetic information of Neotropical odonates and considering that the identification of specimens is the main limiting aspect in the knowledge about biodiversity, particularly in ecological studies (Hortal et al. 2015), I have sought to provide technical and application support for the use of molecular markers in dragonflies, especially for Neotropical species by using five studies. I also

focused on the implication of the findings for fields such as ecology, conservation biology, and biomonitoring in which application of molecular techniques are considered promising.

First, the quality and quantity of sequences recorded in a public database for dragonfly species found in seven countries of South America was analyzed and is presented in Chapter 1. A species inventory using traditional taxonomy for the survey of species in a highly threatened region in South America, Bodoquena Plateau, Brazil, was then performed and is discussed in Chapter 2. This inventory was used as support for the third chapter, in which a DNA barcode database of dragonfly species present in this region was constructed, and the ability of this technique to identify specimens and the presence of possible cryptic species was evaluated and is discussed. Considering that the use of barcode DNA as a tool for species identification requires the presence of the barcode gap, the ability of the thresholds indicated by Hebert et al. (2003) to identify species of dragonflies at a global level was tested and is presented in Chapter 4. Finally, aiming to synthetize the information about the use of the DNA barcode method in dragonflies, a mini-review about the current use of this technique and the challenges to be overcome for ecological studies was written and is presented in Chapter 5.

Chapter 1. Shortfalls in molecular knowledge of South American dragonflies

Ana Cláudia Piovezan Borges, Marciel Elio Rodrigues, Aline Pedroso Lorenz-Lemke and Fabio de Oliveira Roque are coauthors of this chapter.

Abstract

In the last decade, molecular information about dragonflies has exponentially increased in databases such as GenBank. Insights from the strategic analysis of such data may accelerate our acquisition of biodiversity knowledge. Here, we provide an appraisal of Odonata molecular data from seven countries in South America. We show that less than 20% of zygopteran species and less than 10% of anisopteran species found in the region have had sequences deposited in GenBank. Specious families (e.g. Lestidae and Platystictidae in Zygoptera, and Aeshnidae and Gomphidae in Anisoptera) have few deposited sequences, which exemplify the gaps in genetic information for South American dragonflies. Recent advances in genetic techniques associated with international collaboration make it possible to bridge this gap.

Introduction

South America is home to broad number of animal species in the world (Meserve 2007), but most of these species have not been described. Despite containing a large fraction of the world's biodiversity, if deforestation, fragmentation and pollution continue at current rates, South American biodiversity will decline to an unacceptable level (Luque et al. 2010, Pimm et al. 2014). Unfortunately, dragonflies are not an exception to this generalization.

Since the first species descriptions in the nineteenth century by Jules P. Rambur, Hermann Burmeister & Michel E. Selys Longchamps, successive studies have added to our knowledge of South American dragonflies (Pinto 2016). Even with these efforts though, many gaps remain. One challenge is the limited number of researchers in the South America and the large task of describing new species and publishing new records for dragonflies (Paulson 2004, Kalkman et al. 2008). Kalkman et al. (2008) summarized, "*high biodiversity is the rule for all of the countries in this region; nevertheless, the Neotropical fauna is the*

least known in the world". Like other taxonomic groups in this biogeographical region, a lack of research funding, limited use of deposited materials in South American collections (Paulson 2004), and large sampling gaps (Vianna & De Marco Júnior 2012) are factors contributing to sparse knowledge of the neotropical fauna.

Advances in molecular techniques, such as DNA barcoding and other mitochondrial/nuclear genetic sequencing, have facilitated species identification and discovery in recent years (Jinbo et al. 2011, Mutanen et al. 2015). From 2006-2016, more than forty thousand mitochondrial and nuclear sequences from dragonflies worldwide were deposited in GenBank; this represents 90% of all deposited sequences for the group. This growth is the result of an increased number of molecular phylogeny studies and descriptions of species using molecular analysis. For Odonata, the countries with the highest absolute number of deposited genetic sequences in GenBank are South Korea, with about 70% of its species represented (Kim et al. 2014) and European countries, which are expected to have complete phylogenies of all species by 2022 (Dijkstra & Kalkman 2012).

For dragonflies, besides the analysis of evolutionary processes (e.g. Swaegers et al. 2013) and the identification of new species (e.g. Wang et al. 2013), molecular tools have contributed to the connection between nymphs and adults (e.g. Orr & Dow 2015) and the discovery of cryptic species (e.g. Yong et al. 2014). In addition, molecular methods provide an independent tool to test phylogenetic relationships (Dijkstra & Kalkman 2012). All of these multiple uses require a robust DNA reference library of morphologically pre-identified vouchers as a database. However, the genetic information available for the order is variable worldwide, with the majority of genetic data collected to date from the Northern Hemisphere due the first establishment of the molecular techniques in these countries.

The deposition of Odonata genetic sequences in public databases is valuable in its own right; however, the data must be compared, analyzed, and interpreted to fully exploit its

for new insights, knowledge and research needs. Analysis of databanks is key to making information easily understood and useful. Without such analysis, the sequences become simply a time-consuming archive with high maintenance costs (Stubbs 2016). We address this need with a state-of-the-art appraisal of trends present in the Odonata molecular data of South America. We focus on dragonfly information recorded in seven countries and evaluate the genes sequenced and the distribution of these sequences among different families. We also analyzed the countries´s origin of authors which deposited sequences in GenBank, and the number of deposited but unpublished sequences. We also discuss strategies to accelerate acquisition of molecular data for Odonata from South America.

Methods

We collected data from seven countries, which had checklist available until March, 2016 (Fig 1.1): Brazil by ICMBIO (2016); Peru by Hoffmann (2009); Ecuador by Haber & Wagner (2014); Colombia by Pérez-Gutierrez & Rodriguez (2011); Argentina by von Ellenrieder & Muzon (2008); French Guiana by Delasalle (2007) (with suggestions from Denis Gaschignard, pers. comm.) and Uruguay by von Ellenrieder et al. (2009). The taxonomic classification of suborders, families and species followed Garrison & von Ellenrieder (2016). The number of registered species we report for each country may not match those published in these checklists because we only consider species with confirmed nominations (i.e., we omit records with only the genus name or with species identified only as, for example, “SpA”) and with corrected synonyms (following Garrison & von Ellenrieder 2016).

Fig 1.1. South American countries included in the study (in grey) and their 2-letter abbreviation.

All data were collected using the GenBank nucleotide database (http://www.ncbi.nlm.nih.gov/genbank/) to search for each dragonfly species in the checklists above. For each sequence found in GenBank, we recorded i) molecular region, ii) year that the related article was published and iii) country for the first author. We used “year of publication” because some older records do not contain the "Direct Submission" reference; for articles not published, the year presented in the "Direct Submission" reference was used instead. The database was accessed on March 8, 2016 all searches. Sequences were identified using the database search service (nucleotide filter), and each result individually inspected to ensure it was a legitimate result and should be included in our data. We evaluated the number of sequenced species for the sixteen regions most commonly sequenced (COI, COII, 12S rRNA, 16S rRNA, Cyt b, tRNA-Leu, tRNA-Val, ND1, H3, EF-1A, ITS 1, ITS 2, 5.8S rRNA, 18S rRNA, 28S rRNA and PRMT; see Ballare & Ware 2011), number of species with

deposited sequences for each country (independently from country origin of the specimen) and the purpose of molecular information in each article. Also, we evaluated whether the amount of deposited sequences is proportional to the number of species in each family (Pearson correlation index; GraphPad Prism 5: GraphPad Software Inc., San Diego, CA, USA. The level of significance adopted was $\alpha < 0.05$). In our research, we did not consider the specimens' origin due some sequences do not have this information and the size of the fragments deposited.

Results and discussion

Of the 1252 species found in the included countries, only 173 (13.81%) had sequences deposited in GenBank (see Table 1.1). More species and sequences have been deposited for Zygoptera (125 species (18.85%) of the total number of species in this suborder; S1 Table in "Supplementary Files" section) than Anisoptera (48 species (8.15%) of the total number of species in this suborder; see S2 Table) (Fig 1.2). The zygopteran families Coenagrionidae, Megapodagrionidae, Calopterygidae and Polythoridae had the most species represented with genetic sequences. For Anisoptera, Libellulidae had the highest number of recorded (288) and sequenced (39) species in GenBank, while other large families, such as Gomphidae and Aeshnidae, had few sequenced species (three species of Aeshnidae and one species of Gomphidae). We verified a correlation between the number of species in each family and the number of species with deposited sequences (Zygoptera, $r=0.9910$, $p < 0,0001$; Anisoptera, $r=0.8406$, $p=0.0090$).

Genetic sequences of South American zygopteran and anisopteran species were first deposited in 1999 and 2001, respectively, with a marked increase in numbers deposited after 2007 (Fig 2). The highest number of zygopteran species and sequences deposited were 2013 (38 species) and 2014 (270 sequences), respectively. In 2014, 240 deposited sequences were

from the Coenagrionidae family. The highest number of anisopteran species and sequences deposited were deposited in 2008 (18 species) and 2013 (80 sequences), respectively. In 2013, 70 deposited sequences were Libellulidae family.

Table 1.1 Molecular information about Odonata species from seven countries of South America. "By research" column presents the number of species for each family (“Sp”) and how many of them have sequences deposited in GenBank (“SpSeq”). "By genes" column presents number of sequenced species by gene; in both columns, the percentage (%) proceeds from number of species with deposited sequences by total number of species in the suborder/order. "By Country" column presents the number of species with deposited sequences and the number of species recorded (deposited species/total number of species) for each country and family; the percentage (%) proceeds from number of species with sequences by total number of species in the suborder/order of each country. (BR, Brazil; AR, Argentina; EC, Ecuador; PE, Peru; UR, Uruguay; CO, Colombia; GU, French Guyana)

Taxa	By research		By genes																By country						
			Mitochondrial								Nuclear														
	Sp	SpSeq	COI	COII	12S	16S	Cyt b	tRNA-Leu	tRNA-Val	ND1	H3	EF-1A	ITS1	ITS 2	5.8S	18S	28S	PRMT	BR	PE	EC	CO	AR	GU	UR
Zygoptera																									
Perilestidae	17	5	1	1	1	3	0	0	0	0	1	0	0	0	0	3	3	0	2/10	2/10	3/8	2/2	0/0	1/2	0/0
Lestidae	24	2	1	1	1	2	0	0	0	1	1	0	0	0	0	1	2	0	1/14	1/8	0/4	1/6	0/10	0/4	0/3
Platystictidae	19	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0/1	0/4	0/6	0/10	0/0	1/1	0/0
Calopterygidae	58	17	15	0	1	3	0	0	0	0	0	0	0	0	0	1	15	0	6/36	8/30	1/20	13/37	2/10	6/9	0/1
Dicteriadidae	2	1	1	0	1	1	0	0	0	0	0	0	0	0	0	1	1	0	1/2	1/1	1/1	1/1	1/1	1/1	0/0
Megapodagrionidae	87	12	9	2	2	9	0	0	0	0	2	0	2	2	2	6	10	0	3/28	4/26	5/26	3/24	1/5	2/6	0/0
Polythoridae	51	12	7	2	2	5	0	1	0	0	2	0	0	0	0	4	5	0	3/10	9/34	8/23	5/21	1/1	1/2	0/0
Amphipterygidae	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	1/1	0/0	0/0	0/0	0/0	1/1	0/0
Coenagrionidae	404	74	26	7	13	60	5	11	1	9	10	5	1	1	1	15	27	2	37/241	39/123	38/106	34/93	12/61	15/54	3/22
Subtotal	663	125	61	13	21	84	5	12	1	10	16	5	3	3	3	32	64	2	54/341	64/228	64/191	60/194	16/89	26/78	3/26
%	-	18.85	9.20	1.96	3.17	12.67	0.75	1.81	0.15	1.51	2.41	0.75	0.45	0.45	0.45	4.83	9.65	0.30	15.84	28.07	33.51	30.93	17.98	33.33	11.54
Anisoptera																									
Petaluridae	1	1	0	1	1	1	0	0	1	0	1	0	0	0	0	1	0	0	0/0	0/0	0/0	0/0	1/1	0/0	0/0
Austropetaliidae	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0/0	0/0	0/0	0/0	0/1	0/0	0/0
Aeshnidae	98	3	1	0	0	3	0	3	0	3	0	0	0	0	0	1	0	0	2/55	2/56	2/45	1/23	2/27	2/27	1/9
Gomphidae	162	1	0	0	1	1	0	0	1	0	0	1	0	0	0	1	1	0	0/105	0/36	0/26	0/19	1/29	0/27	0/7
Neopetaliidae	1	1	1	0	1	1	0	0	1	0	0	1	0	0	0	1	1	0	0/0	0/0	0/0	0/0	1/1	0/0	0/0
Synthemistidae	3	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	1	0	0/0	1/2	0/1	0/0	1/3	0/0	0/0
Corduliidae	35	2	0	0	0	2	0	0	0	0	0	0	0	0	0	0	2	0	1/32	1/3	0/3	0/1	1/2	1/5	0/0
Libellulidae	288	39	4	2	25	25	1	1	21	2	2	19	3	3	3	5	27	0	32/221	32/150	31/133	29/106	19/102	31/120	6/26
Subtotal	589	48	6	3	29	33	1	4	24	5	3	22	3	3	3	9	33	0	35/413	36/247	33/208	30/149	26/166	34/179	7/42
%	-	8.15	1.02	0.51	4.92	5.60	0.17	0.68	4.07	0.85	0.51	3.74	0.51	0.51	0.51	1.53	5.60	0	8.47	14.57	15.87	20.13	15.66	18.99	16.67
Total	1252	173	67	16	50	117	6	16	25	15	19	27	6	6	6	41	97	2	89/754	100/475	97/399	90/343	42/255	60/257	10/68
%	-	13.81	5.35	1.28	3.99	9.35	0.48	1.28	2.00	1.20	1.52	2.16	0.48	0.48	0.48	3.27	7.75	0.16	11.80	21.05	24.31	26.24	16.47	23.35	14.71

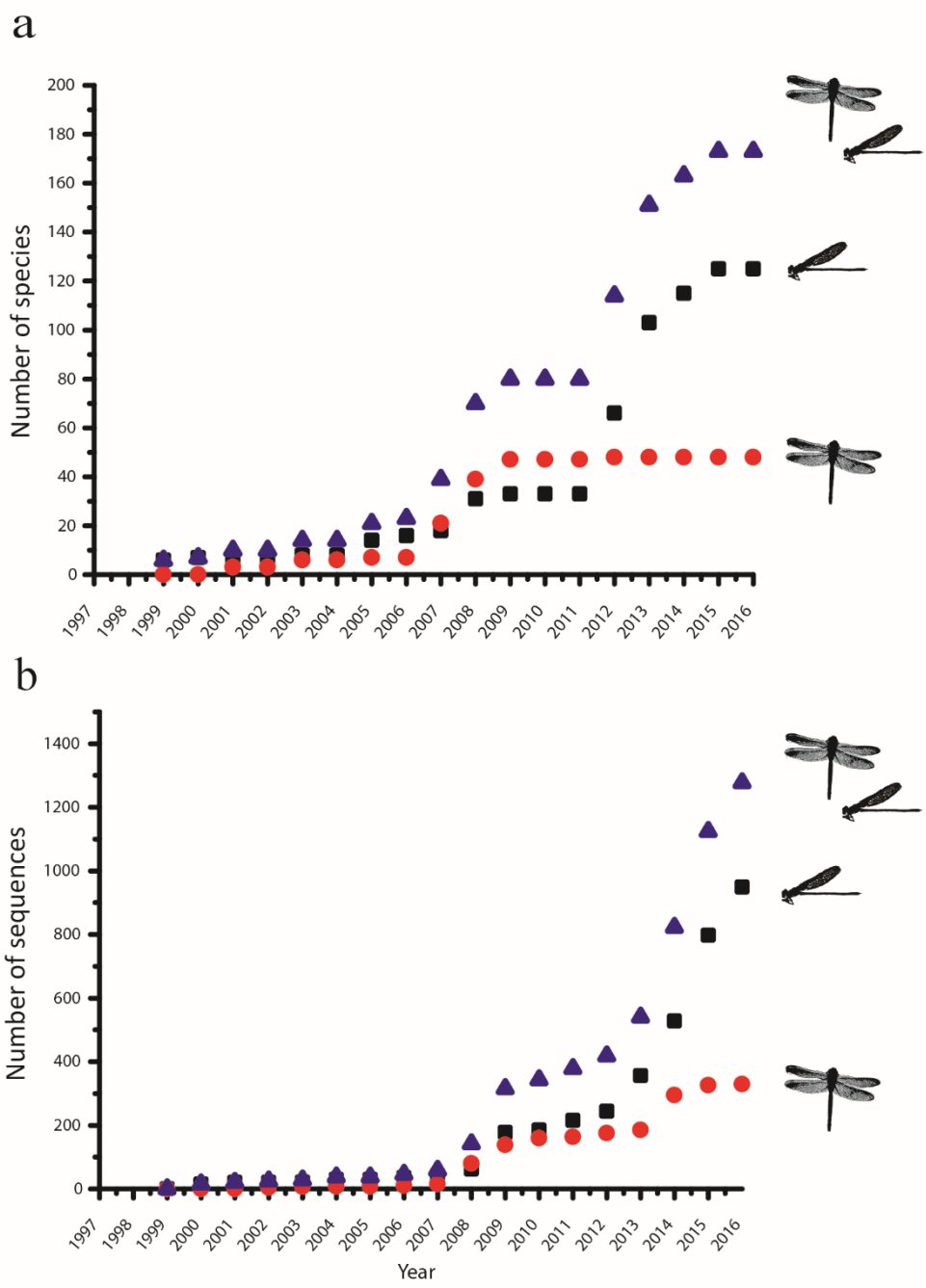

Fig 1.2. Accumulated number of (a) species and (b) sequences deposited in GenBank related to South American dragonflies species for Zygoptera (squares), Anisoptera (circles) and dragonflies (Zygoptera+Anisoptera) (triangles) since 1997.

The 16S rRNA gene had the largest number of sequences deposited for dragonflies (9.35% of all species found in the region), followed by the 28S rRNA gene (7.75% of all species found in the region) and the mitochondrial cytochrome oxidase I

(COI) gene (5.35 % of all species found in the region) (Table 1.1). This pattern also occurred when considering only the suborder Zygoptera, where 12.67% of the species had 16S rRNA sequences, 9.65% of the species had 28S rRNA sequences and 9.20% of the species had COI sequences. In Anisoptera, 16S rRNA and 28S rRNA genes again represented the largest number of species' sequences deposited (5.60% of all species found in the region), but the third most common was the 12S rRNA gene (4.92% of all species found in the region).

Brazil had the largest number of species recorded for both suborders (Zygoptera: 341 species; Anisoptera: 413 species) of the seven countries (Table 1.1). However, it also had the lowest percentage of species with molecular information (11.80%). Countries with the highest percentage of sequenced species were Colombia (26.24%), Ecuador (24.31%), French Guiana (23.35%) and Peru (21.05%). In summary, countries with greater diversity of species present the least number of species sequenced.

About the sequences deposited in GenBank, the time gap between the first species of dragonfly deposited in the world, *Sympetrum striolatum* (Charpentier), in 1992 (Liu & Beckenbach 1992) and the first species deposited from South America, *Ischnura denticollis* (Burmeister), *Ischnura hastata* (Say) and *Telebasis salva* (Hagen), in 1999 (Chippindale et al. 1999), reveals the delayed start of the genetic research in the region. Currently, sources of genetic sequences as molecular phylogenies from South American dragonfly species are still rare (e.g. van Tol et al. 2009), even when compared with other insect orders from this region, such as Diptera (e.g. Robe et al. 2005, Wilkerson et al. 2005). North American and European researchers deposit the majority of sequences in GenBank for the South American Odonata species. Publications, such as Caesar (2012), Dijkstra et al. (2014), have significantly contributed to genetic information about species found in Peru, Ecuador and French Guiana. These same

countries, along with Colombia, also have the highest proportion of species with deposited sequences; this suggests an important role for foreign partnerships in genetic surveys of South American Odonata.

Although there is a positive correlation between the number of described species and the number of deposited sequences, the gaps in genetic information for Anisoptera remains much higher than for Zygoptera (Garrison et al. 2006, 2010). This difference reflects not only the larger number of researchers studying Zygoptera, but also the ecological and behavioral characteristics of species in the two suborders (Silva et al. 2010, De Marco et al. 2015). First, zygopteran specimens are more easily and efficiently sampled than anisopteran specimens. Second, studies in the area of ecology and conservation often use zygopteran species as models because they represent the dominant group in tropical streams (Dijkstra & Lempert 2003, Garrison et al. 2010, Juen & de Marco 2011). Third, zygopteran species respond more effectively to local environmental changes (D'Amico et al. 2004, Dutra & de Marco 2015, Rodrigues et al. 2016b) and have lower dispersal abilities than anisopteran species (Rouquette & Thompson 2007, Samejima & Yoshitaka 2010).

Sequences deposited in GenBank from South American species are of the same genes used in other regions of the world (Ballare & Ware 2011), except for the greater proportion of sequences of 28S rRNA than 12S rRNA sequences. A more careful evaluation reveals that most of the sequences from South American Odonata were generated by global molecular phylogeny studies (e.g. Dijkstra et al. 2014, Dumont et al. 2005, Fleck et al. 2008), which may explain the prevalence of 28S rRNA sequences. However, common genes used to identify species, such as the COI for DNA barcoding, were less frequently represented. This challenges the application of recent techniques like metabarcoding (also referred to as "metagenomics" or "environmental barcoding"

in the literature), a promising approach to search target species and determine community composition in aquatic environments (Brandon-Mong et al. 2015). Faced with this lack of COI data, projects related to the International Barcode of Life (iBOL) are expected to contribute to the local wildlife genetic information. In South America, research groups are registered from Brazil, Argentina, Peru and Colombia connected with iBOL, with Brazil and Argentina both running projects focused on aquatic insects.

Technological advances are revolutionizing the collection of information on animal diversity and ecology (Hortal et al. 2015). Despite optimistic expectations, progress in the field of molecular biodiversity depends directly on taxonomic knowledge of species and on research groups collecting molecular data. As such, the main challenges faced in Odonatology research progress in South America are to increase the number of experts and general public interested in dragonflies, and to overcome bureaucratic problems, such as difficulties with international loans and difficulties with permission for dissection of loaned type specimens (see Rafael et al. [2009], which can be extrapolated to all South American countries). As we show here, and as the history of entomology has proven, collaboration between national and international research groups boosts knowledge of Neotropical insects (Hogue 1993). The promotion and strengthening of research groups, such as the initiatives Barcode of Life in Brazil (BrBol) and Argentina (IBol Argentina), can improve the ability of tropical nations to increase their participation in global initiatives that use molecular information as part of a strategy for evaluating progress towards the Convention on Biological Diversity's Aichi Targets 2011–2020 (https://www.cbd.int/sp/targets/), particularly with regard to disseminating biodiversity knowledge, status and trends.

Chapter 2. Odonates from Serra da Bodoquena region: checklist, information about endangered species and new distribution record for Mato Grosso do Sul state, Brazil

Marciel Elio Rodrigues, Francisco Valente-Neto and Fabio de Oliveira Roque are coauthors of this chapter.

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Abstract

Here we provide an updated checklist of the odonates from Bodoquena Plateau, Mato Grosso do Sul state, Brazil. We registered 111 species from the region. The families with the highest number of species were Libellulidae (50 species), Coenagrionidae (43 species) and Gomphidae (12 species). 35 species are registered in the IUCN Red List species, four being Data Deficient, 29 of Least Concern and two species being in the threatened category. *Phyllogomphoides suspectus* Belle, 1994 (Odonata: Gomphidae) was registered for the first time in the state.

Introduction

Insects are arthropod group with largely unknown distribution patterns (Diniz-Filho et al. 2010), due to their high species richness, difficulties related to sampling and lack of taxonomic experts. Applying all of these conditions, odonates (Insecta: Odonata) constitutes an important group that play a major role as predators, with several insects making up a large portion of their diets. This group is also a good indicators of water quality, with their nymphs being an important link in food chains for fish and other aquatic vertebrates and serve as an inspired subject for artists, naturalists and collectors (Abbott 2015).

Even with important taxonomists in the recent Brazilian history, odonates are still poorly described and its distribution is deficiently known in the Neotropical region (Kalkman et al. 2008). Local inventories are recorded to several parts of Brazil like São Paulo (Costa et al. 2000), Espirito Santo (Costa & Oldrini 2005), Rio de Janeiro (Anjos-Santos & Costa 2006), Goiás and Distrito Federal (Nóbrega & De Marco 2011), Minas Gerais (de Souza et al. 2017), and Rio Grande do Sul (Renner et al. 2016). In Mato Grosso do Sul, state originally covered by Cerrado, Pantanal, Atlantic Forest and Chaco

vegetation, 198 odonatan species were registered (Rodrigues & Roque 2017). Despite this number, information gaps are recognized from many areas in this state (Vianna & De Marco Júnior 2012, Rodrigues & Roque 2017).

Bodoquena Plateau is a threatened area in the Mato Grosso do Sul state because of the broad conversion of natural areas to pastures and croplands (Roque et al. 2016). In the last five years, several research projects about biodiversity and the ecology of aquatic insects have been developed in Bodoquena Plateau, (e.g. LTER Planalto da Bodoquena, Dragonflies of Serra da Bodoquena Project and Observagua Project). These projects have promoted a great opportunity for extending sampling effort of aquatic insects, especially for odonates (e.g. Koroiva et al. 2016, Rodrigues et al. 2016a, c, Valente-Neto et al. 2016). Until 2011, about 68 Odonata species were registered to Bodoquena Plateau; a number that was considered underestimated because of the broad unsampled area (Dalzochio et al. 2011b). Therefore, even with the publications of checklists (Dalzochio et al. 2011a, b, Rodrigues & Roque 2017), the amount of information generated by these new sampling efforts and visits to museums demand an update of the local checklist.

Here, we provide an updated checklist of the odonates from Bodoquena Plateau, including species records from recent sampling efforts, from the literature, and from specimens deposited in the Reference Collection of the Federal University of Mato Grosso do Sul (CEUFMS). We also provide information about endangered species from the IUCN Red List (IUCN 2016), which is fundamental for updating the status of Brazilian species, as recently emphasized in the 1st Meeting of the Latin American Odonatological Society - SOL.

Methods

Sources of data

We used different sources of information to produce the checklist, including samplings (from 2011 to 2016), previous available records on literature and information collected in zoological reference collections of the Mato Grosso do Sul state. For each source, we searched for names and geographic coordinates of the locations. For records that did not have latitude and longitude values, geographic coordinates of the centroid of the place where the site.

Sampling in study region

All the sampling sites were located within Bodoquena Plateau region (21º08’02” to 20º38’26”S and 56º48’31” to 56º44’28”W). The Bodoquena Plateau is located in the mid-southern portion of Mato Grosso do Sul State, including the cities of Bodoquena, Bonito and Jardim. The region is characterized by a mountain chain, with altitudes varying between 450 and 800 m. The climate is temperate humid with hot summers and two well-defined seasons. The average annual temperature varies between 20 and 22ºC and annual rainfall varies between 1300 and 1700 mm. The hydrography of the region is characterized by limestone, rivers with high alkalinity and low turbidity. Its tributaries are part of the Paraguay River watershed (Brasil 1997).

Bodoquena Plateau has both areas of the Cerrado (Brazilian savanna) and Atlantic Forest biomes. This region is an important ecological corridor for biodiversity and one of the most important areas of Ecotourism in Brazil (Klein et al. 2011). Considered a priority area for conservation by the Brazilian Ministry of Environment (MMA) (Brasil 2016), the region is currently threatened by inadequate exploitation of its resources and the progressive agricultural expansion.

The dataset used in this checklist included 85 lotic environments (Fig 2.1) sampled during the period between 2011 and 2016. These samples were concentrated on adults from Odonata and were performed during Ph.D studies (Valente-Neto 2015, Rodrigues 2016), Long term ecological research in the Bodoquena Plateau (LTER-Serra da Bodoquena), Dragonflies of Serra da Bodoquena Project and Observagua Project. The sampling method used handhold insect nets, in sunny days, during the peak time of Odonata activities (between 09:00 h to 16:00 h). The collection authorization process was issued by IBAMA, through SISBio system under the number 41313-3 and 54386-1. All specimens collected were deposited in the Reference Collection of the Universidade Federal de Mato Grosso do Sul (CEUFMS), afterwards determined in laboratory according to Garrison et al. (2006, 2010), Heckman (2006, 2008) and Lencioni (2005, 2006). For the systematics classification, we followed Dijkstra et al. (Dijkstra et al. 2013) and for scientific names and followed the synonymic list of Garrisson & von Ellenrieder (2016). In the laboratory, dragonflies were analyzed under Zeiss Discovery V20 stereoscope and recorded with an AxioCam Icc 5 Microscope Camera. For capturing and editing images, we used the software Zen 2-2011.

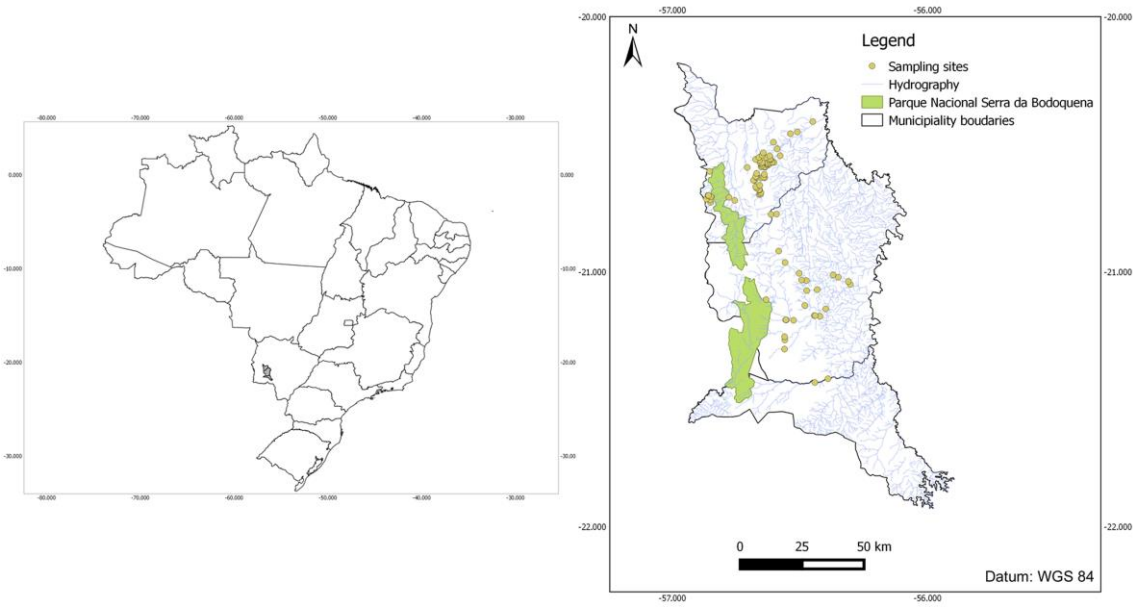


Fig 2.1. Sampling locations in the Bodoquena Plateau region. On the north is the municipality of Bodoquena; on the middle is the municipality of Bonito and on the south is the municipality of Jardim.

Data analysis

We estimated the sampling accuracy of sampling sites with incidence-based non-parametric estimators: Chao 2, Jacknife 1 and Jacknife 2. Non-parametric methods have better performance compared to others estimators for aquatic insects (Melo & Froehlich 2001). These analyses were performed with EstimateS version 9.1.0 software (Colwell 2013). We set 1000 repetitions to calculated mean values with confidence intervals of 95%.

Literature and reference collections information

Aiming to improve our list of species, we used online available databases to find registers of Odonata species from Bodoquena Plateau, specifically Web of Knowledge (which includes the main journals of world), Scielo (which include the main journals of

South America) and Google Scholar. We did the search on general keywords like "Odonata", "dragonfly" or "libélula" ("Dragonfly" in Portuguese) in combination with "Mato Grosso do Sul", "Bodoquena Plateau" or "Serra da Bodoquena" ("Bodoquena Plateau" in Portuguese). Souza (2003), Dalzochio et al. (Dalzochio et al. 2011a, b) provided additional information about registers of Odonata species ("Reference" in Table 2.1).

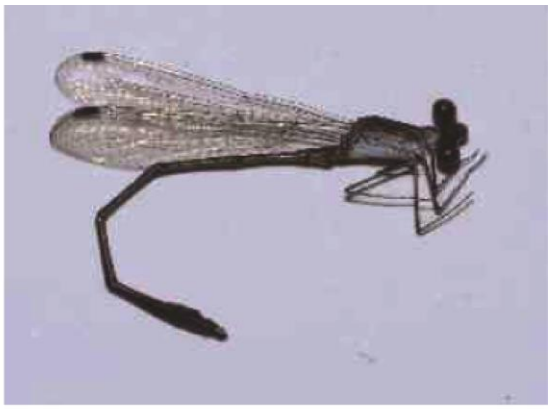
In addition, we analyzed the deposited specimens from two important Zoological collections of Mato Grosso do Sul state: Reference Collection Universidade Federal de Mato Grosso do Sul (CEUFMS) and Biodiversity Museum of Universidade Federal da Grande Dourados (UFGD). CEUFMS provided additional register besides that found in the project samples or in literature ("CEUFMS" in Table 2.1).

Results

Species list

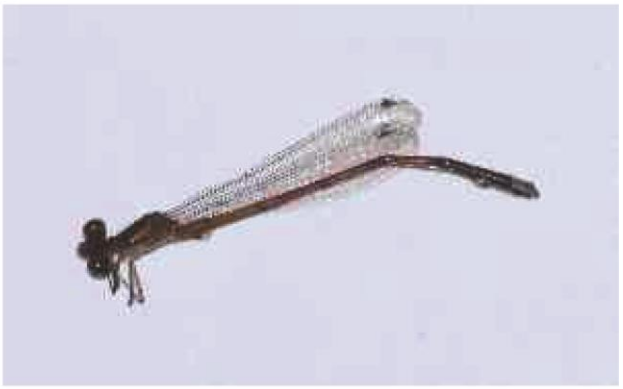
Sampling projects data recorded 67 species, belonging to 42 genera in six families, totaling 1902 collected specimens (Fig 2.2). The estimators showed that this richness corresponds to 79.99, 76.35 and 69.99 % of the medium estimated richness by, respectively, Chao 2 (Sest = 83.76, standard deviation. = ±9.59), Jackknife 1 (Sest = 87.75, standard deviation = ±4.85) and Jackknife 2 (Sest = 95.72). The accumulation curves obtained are non-asymptotic (Fig 2.3), thus indicating that total species richness would probably increase with additional sampling effort.

Elga newtonsantosi Machado, 1992



Lestes biupilatus Calvert, 1909

Erythrodiplax basalis (Kirby, 1897)



Oxyagrion terminale Selys, 1876

Ischnura fluviatilis Selys, 1876

Perithemis mooma Kirby, 1889

Fig 2.2. Examples of Odonata specimens collected in the Serra da Bodoquena.

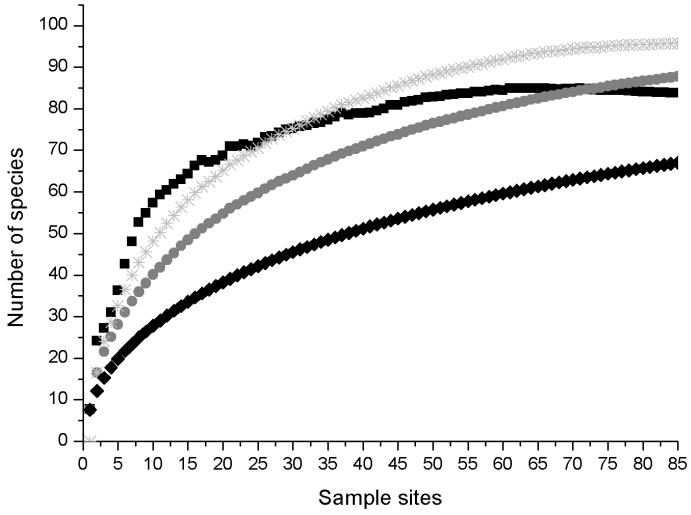


Fig 2.3. Accumulation curves for observed and estimated number of species collected at 85 sample points. The estimates were calculated with the estimator Chao 2, Jackknife 1 and Jackknife 2. Black diamonds = number of species observed (est); Black squares = Chao 2 richness estimator; Grey circles = Jackknife 1 richness estimator; Grey stars = Jackknife 2 richness estimator. All curves are plotted form the means of 1000 randomizations of sample accumulation order.

The Odonata list records from the Bodoquena Plateau are presented in Table 2.1. We added another fourty-four species that were registered in the literature (34 species) or deposited in the Reference Collection of the Federal University of Mato Grosso do Sul (10 species). Thus, we have considered the presence of 111 Odonata species. We recorded for the first time the presence of 42 species from Bodoquena Plateau (24 anisopterans and 18 zygopterans). In this inventory list, 35 species are registered in IUCN red List (IUCN 2016), with four being in Data Deficient (DD), 29 in Least Concern (LC) and two species are in threatened categories, *Elga newtonsantosi* Machado, 1992 like Critically Endangered (CR) and *Micrathyria pseudhypodidyma* Costa, Lourenço & Viera, 2002 like Vulnerable (VU).

Table 2.1. Inventory list of Odonata species from Bodoquena Plateau with information about endangered species (IUCN). CR = Critically Endangered, VU = Vulnerable, LC = Least Concern, DD = Data Deficient; *, first record to Bodoquena Plateau.

Suborder	Family	Species	Source	IUCN Red list status
Anisoptera	Aeshnidae	*Castoraeschna* sp Calvert, 1952 *	This study (BOMS 0052/UFMS BOMS 0053/UFMS)	-
		Staurophlebia reticulata Burmeister, 1839 *	This study (CANI 414/UFMS)	-
	Gomphidae	*Agriogomphus ericae* Belle, 1966	Reference (Dalzochio et al. 2011b)	-
		Archaeogomphus sp Williamson, 1919	Reference (Dalzochio et al. 2011b)	-
		Cyanogomphus sp Selys, 1873	Reference (Dalzochio et al. 2011b)	-
		Gomphoides infumata Rambur, 1842	Reference (Dalzochio et al. 2011a)	-
		Phyllogomphoides suspectus Belle, 1994 *	This study (6-R15-04/UFMS	DD
		Phyllocycla sp Calvert, 1948	This study (CANI336/UFMS)	-
		Progomphus amazonicus Belle, 1973	Reference (Dalzochio et al. 2011a)	DD
		Progomphus intricatus Hagen in Selys, 1858	Reference (Dalzochio et al. 2011b)	LC
		Progomphus montanus Belle, 1973	Reference (Dalzochio et al. 2011a)	LC
		Progomphus sp1 Selys, 1854	This study (CANI 411/UFMS)	-
		Progomphus sp2 Selys, 1854	This study (CANI 334/UFMS)	-
		Remartinia sp Navás, 1911 *	This study (CANI 017/UFMS)	-
	Libellulidae	*Brechmorhoga* sp Kirby, 1894	Reference (Dalzochio et al. 2011b)	-
		Dythemis sterilis Hagen, 1861	This study (6-R15-21/UFMS)	-
		Elasmothemis cannacrioides Calvert, 1906 *	This study (6-R15-28/UFMS, 6-R15-14/UFMS, 6-R15-8/UFMS)	-
		Elasmothemis williamsoni Ris, 1919	Reference (Dalzochio et al. 2011a)	-
		Elga newtonsantosi Machado, 1992 *	This study (CANI 833/UFMS, CANI 413/UFMS)	CR
		Erythemis vesiculosa Fabricius, 1775	This study (1-R19-3/UFMS)	LC
		Erythemis mithroides Brauer in Therese, 1900 *	CEUFMS (CEUFMS 6048)	LC
		Erythemis peruviana Rambur, 1842 *	CEUFMS (CEUFMS 6044, CEUFMS 6046, CEUFMS 6047)	-
		Erythemis plebeja Burmeister, 1839	CEUFMS (CEUFMS 6043)	LC

Erythrodiplax basalis Kirby, 1897 *	This study (CANI 011/UFMS, CANI 015/UFMS, CANI 09/UFMS, CANI 222/UFMS)	-
Erythrodiplax branconensis Sjöstedt, 1929 *	This study (CANI 217/UFMS)	-
Erythrodiplax famula Erichson in Schomburgk, 1848	Reference (Dalzochio et al. 2011a)	-
Erythrodiplax fusca Rambur, 1842	This study (3-R14-11/UFMS, 3-R14-10/UFMS, 3-R14-24/UFMS, 6-R15-3/UFMS)	-
Erythrodiplax kimminsi Borror, 1942 *	This study (CANI 088/UFMS)	-
Erythrodiplax lativittata Borror, 1942 *	This study (CANI 405/UFMS, CANI 499/UFMS, CANI 505/UFMS, CANI 502/UFMS)	-
Erythrodiplax ochracea Burmeister, 1839	This study (8-R22-1/UFMS, 8-R22-4/UFMS, 8-R22-5/UFMS)	LC
Erythrodiplax paraguayensis Förster, 1905	This study (BNBTO-0005/UFMS)	LC
Erythrodiplax umbrata Linnaeus, 1758	This study (7-R21-1/UFMS, 7-R21-2/UFMS, 7-R21-4)	-
Macrothemis flavescens Kirby, 1897 *	This study (CANS 480/UFMS)	LC
Macrothemis hemichlora Burmeister, 1839	This study (BOMS-0328/UFMS)	LC
Macrothemis heteronycha Calvert, 1909	Reference (Dalzochio et al. 2011b)	LC
Macrothemis imitans imitans Karsch, 1890	Reference (Dalzochio et al. 2011a)	-
Macrothemis sp Hagen, 1868 *	This study (BOMS0379/UFMS)	-
Miathyria marcella Selys in Sagra, 1857	This study (2-R16-3/UFMS, 7-R21-6/UFMS)	LC
Micrathyria catenata Calvert, 1909	Reference (Souza 2003)	LC
Micrathyria hesperis Ris, 1911	CEUFMS (CEUFMS 6019, CEUFMS 6020, CEUFMS 6021)	-
Micrathyria laevigata Calvert, 1909	This study (CANI 019/UFMS)	-
Micrathyria longifasciata Calvert, 1909	Reference (Dalzochio et al. 2011b)	LC
Micrathyria ocellata Martin, 1897	CEUFMS (CEUFMS 5998, CEUFMS 5999, CEUFM 6008)	-
Micrathyria pseudeximia Westfall, 1992	Reference (Souza 2003)	-
Micrathyria pseudhypodidyma Costa, Lourenço & Viera, 2002 *	This study (CANI 433/UFMS, CANI 432/UFMS)	VU
Micrathyria stawiarskii Santos, 1953 *	This study (BOMS0076/UFMS)	LC
Micrathyria tibialis Kirby, 1897	Reference (Souza 2003)	LC
Micrathyria ungulata Förster, 1907 *	This study (CANI 013/UFMS)	-
Oligoclada sp. Karsch, 1890	Reference (Souza 2003)	-
Orthemis cultriformis Calvert, 1899 *	This study (BNBTO202-12/UFMS)	-
Orthemis discolor Burmeister, 1839	This study (1-R19-7/UFMS)	-

		Orthemis ferruginea Fabricius, 1775 *	CEUFMS (CEUFMS 5886, CEUFMS 5888, CEUFMS 5889)	LC
		Orthemis schmidti Buchholz, 1950	CEUFMS (CEUFMS 59891)	-
		Pantala flavescens Fabricius, 1798	This study (BOMS0088/UFMS)	LC
		Pantala hymenae Say, 1839 *	This study (CANI 041/UFMS)	-
		Perithemis electra Ris, 1930 *	This study (CANI 588/UFMS, CANI 514/UFMS, CANI 517/UFMS, CANI 501/UFMS)	LC
		Perithemis icteroptera Selys in Sagra, 1857 *	This study (13-R31-2/UFMS)	LC
		Perithemis lais Perty, 1834	This study (CANI 301/UFMS, CANI 459/UFMS)	LC
		Perithemis mooma Kirby, 1889	This study (CANI 460/UFMS)	-
		Perithemis thais Kirby, 1889	This study (CANI 481/UFMS, CANI 468/UFMS, CANI 464/UFMS, CANI 463/UFMS)	-
		Tauriphila australis Hagen, 1867	Reference (Souza 2003)	-
		Tramea cophysa Hagen, 1867 *	CEUFMS (CEUFMS 6082, CEUFMS 6093, CEUFMS 6084)	-
		Tramea minuta De Marmels & Rácenis, 1982	Reference (Dalzochio et al. 2011a)	-
		Tramea rustica De Marmels & Rácenis, 1982 *	CEUFMS (CEUFMS 6074, CEUFMS 6075, CEUFMS 6076)	LC
Zygoptera	Calopterygidae	*Hetaerina mortua* Hagen in Selys, 1853 *	This study (CZYG 693/UFMS)	-
		Hetaerina rosea Selys, 1853	This study (6-R15-23/UFMS, 02-R16-01/UFMS, 4-R17-1/UFMS, 4-R17-2/UFMS)	-
	Coenagrionidae	*Acanthagrion aepiolum* Tennessen, 2004	This study (12-R25-18/UFMS, 9-R27-5/UFMS, 10-R28-8/UFMS, 13-R30-16/UFMS)	-
		Acanthagrion apicale Selys, 1876	Reference (Dalzochio et al. 2011a)	-
		Acanthagrion ascendens Calvert, 1909	Reference (Dalzochio et al. 2011a)	-
		Acanthagrion chararum Calvert, 1909	Reference (Dalzochio et al. 2011b)	-
		Acanthagrion cuyabae Calvert, 1909	This study (10-R28-2/UFMS, 10-R28-6/UFMS, 10-R28-7/UFMS)	LC
		Acanthagrion gracile Rambur, 1842	This study (8-R22-2/UFMS, 12-R25-20/UFMS, 12-R25-17/UFMS)	-
		Acanthagrion temporale De Marmels, 1985	Reference (Souza 2003)	-
		Acanthagrion truncatum Selys, 1876	Reference (Souza 2003)	LC
		Aeolagrion dorsale Burmeister, 1839 *	This study (CZYG 1011/UFMS, CZYG 1551/UFMS)	-
		Argentagrion ambiguum Ris, 1904 *	CEUFMS (CZYGO 5001/UFMS)	-
		Argia chapadae Calvert, 1909 *	This study (5-R13-1/UFMS, 3-R14-16/UFMS, 6-R15-1/UFMS, 1-R19-10/UFMS)	-
		Argia croceipennis Selys, 1865	This study (CZYG 1504/UFMS, CZYG 1837/UFMS, CZYG	LC

	1328/UFMS, CZYG 1329/UFMS)	
Argia cupraurea Calvert, 1902	Reference (Souza 2003)	-
Argia hasemani Calvert, 1909 *	This study (CZYG 1779/UFMS, CZYG 1791/UFMS, CZYG 501/UFMS)	-
Argia indocilis Navás, 1934	This study (CZYG 873/UFMS)	-
Argia lilacina Selys, 1865 *	This study (CZYG 412/UFMS)	-
Argia modesta Selys, 1865 *	This study (BNBTO-0288/UFMS)	-
Argia mollis Hagen in Selys, 1865 *	This study (3-R14-17/UFMS)	-
Argia reclusa Selys, 1865 *	This study (6-R15-16/UFMS, 1-R19-11/UFMS, 9-R27-1/UFMS, 13-R30-2/UFMS)	-
Argia smithiana Calvert, 1909 *	This study (BNBTO-0093)	-
Argia subapicalis Calvert, 1909 *	This study (CZYG 509/UFMS)	DD
Argia tamoyo Calvert, 1909	This study (BNBTO-0289/UFMS)	-
Enallagma novaehispaniae Calvert, 1907	This study (CZYG 742/UFMS, CZYG 1128/UFMS, CZYG 1137/UFMS)	-
Epipleoneura metallica Rácenis, 1955 *	This study (BNBTO244-12/UFMS)	LC
Epipleoneura venezuelensis Rácenis, 1955	This study (CZYG 958/UFMS, CZYG 1112/UFMS, CZYG 1116/UFMS)	-
Forcepsioneura sp. Lencioni, 1999	Reference (Souza 2003)	-
Homeoura chelifera Selys, 1876	Reference (Dalzochio et al. 2011a)	-
Homeoura nepos Selys, 1876 *	This study (CZYG 433/UFMS, CZYG 437/UFMS)	-
Ischnura capreolus Hagen, 1861	Reference (Souza 2003)	-
Ischnura fluviatilis Selys, 1876	Reference (Souza 2003)	LC
Metaleptobasis lillianae Daigle, 2004 *	This study (CZYG 1358/UFMS, CZYG 1359/UFMS)	DD
Neoneura bilinearis Selys, 1860 *	This study (CZYG 2091/UFMS, CZYG 2101/UFMS, CZYG 2099/UFMS)	LC
Neoneura ethela Williamson, 1917	This study (CZYG 1815/UFMS, CZYG 1828/UFMS, CZYG 1397/UFMS)	-
Neoneura rubriventris Selys, 1860	This study (CZYG 8908/UFMS, CZYG 8907/UFMS, CZYG 8906/UFMS	-
Neoneura sylvatica Hagen in Selys, 1886	This study (05-R13-09/UFMS, 06-R15-31/UFMS, 13-R30-22/UFMS)	-
Oxyagrion chapadense Costa, 1978	Reference (Dalzochio et al. 2011b)	-
Oxyagrion sulmatogrossense Costa, Souza & Santos, 2000 *	This study (9-R27-3/UFMS)	-

	Oxyagrion terminale Selys, 1876 *	This study (CZYG 189/UFMS)	-
	Peristicta aeneoviridis Calvert, 1909	This study (CEUFMS 8925, CEUFMS 8926, CEUFMS 8924)	-
	Peristicta muzoni Pessacq & Costa, 2007	Reference (Dalzochio et al. 2011b)	-
	Telebasis sanguinalis Calvert, 1909	Reference (Souza 2003)	-
	Telebasis willinki Fraser, 1948	Reference (Dalzochio et al. 2011a)	LC
	Tigriagrion aurantinigrum Calvert, 1909 *	This study (13-R30-24/UFMS)	-
Lestidae	*Lestes forficula* Rambur, 1842	This study (CEUFMS 8903, CEUFMS 8902, CEUFMS 8901)	-
	Lestes curvatus Belle, 1997	Reference (Souza 2003)	LC

The families with the higher number of species were Libellulidae (45.05%), Coenagrionidae (38.74%) and Gomphidae (10.81%) (Table 2.2). The most speciose genus were *Argia, Micrathyria* and *Erythrodiplax*, represented by twelve, ten and nine species, respectively. The endangered species classified in the IUCN Red List, *Elga newtonsantosi* and *Micrathyria pseudhypodidyma*, were registered only in two and one sampled sites, respectively.

Table 2.2. Number of Odonata species collected per family in the Bodoquena Plateau.

SUBORDER **FAMILY**	**Number**	**%**
ANISOPTERA		
Aeshnidae	2	1.80
Gomphidae	12	10.81
Libellulidae	50	45.05
ZYGOPTERA		
Calopterygidae	2	1.80
Coenagrionidae	43	38.74
Lestidae	2	1.80
TOTAL	111	100

New record

We found that *Phyllogomphoides suspectus* Belle, 1994 represents a new records of odonate species for Mato Grosso do Sul state, compared with the list published by Rodrigues & Roque (2017). The genus *Phyllogomphoides* Belle, 1970, is composed of 45 species in the Neotropical Region, 29 of these in South America (Belle 1994). *Phyllogomphoides suspectus* Belle, 1994 has a distribution recorded by Belle (1994) and von Ellenrieder (2009b) and is considered exclusive to Brazil. The species distribution ranges from Rondonia to the Mato Grosso state with specimens found in Rio Ouro Preto and Sinop, respectively (Belle 1994), around 800 km northwards of our sampling site.

We collected one male adult of *Phyllogomphoides* in the rural area of Bonito, Mato Grosso do Sul state, Brazil. This specimen was identified as *P. suspectus* (Fig 2.4a), according to the characteristics indicated by Belle (1994) and Heckman (2008), like spines along ventral tergal margins of abdominal segment 7 small and largely black (Fig 2.4b), the cerci, in dorsal view, with forcipate shape (Fig 2.4c) and with a hatchet-shaped inferior protuberance near the base (Fig 2.4d) and anterior genital hamules without a posterior black hook (Fig 2.4e).

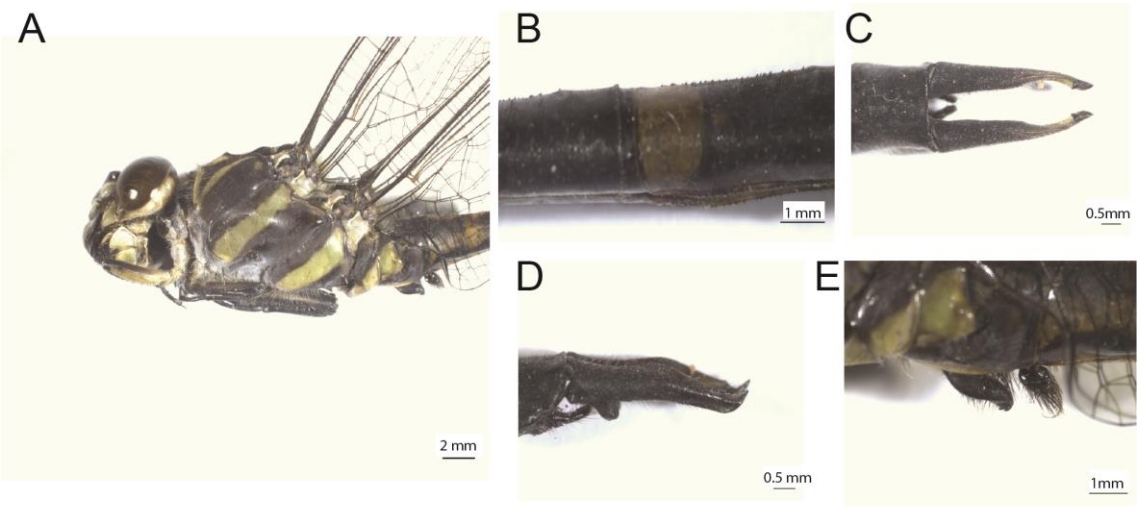


Fig 2.4. *Phyllogomphoides suspectus* (Belle, 1994): (A) adult male specimen; (B) lateral overview of abdomen (segment 7); (C) male caudal appendices: dorsal view; (D) male caudal appendices: lateral view; (E) male genital hamule: lateral view.

Discussion

Inventories promote skeletal support in many fields, including biogeography, population and community ecology. Such data establish a baseline of biodiversity and ecological information, which allow their application in conservation strategies. The list of species shown here represents 55.77% of all species recorded for Mato Grosso do Sul (199 species) (Rodrigues et al. 2016a, Rodrigues & Roque 2017), and is a significant advance in comparison with previous accounts (Souza 2003, Dalzochio et al. 2011a, b), increasing by 42 odonate species list of Bodoquena Plateau region.

Considering that insect inventories, especially those of very species-rich taxa in tropical region, are often incomplete (Gotelli & Colwell 2001), our results show that accumulation curves have not tended to stabilize. The reference source emphasize this result, because there are 44 species registered by Souza (Souza 2003) and Dalzochio et al. (2011a; b) and not sampled by the projects. Other reasons for the high number of non-sampled species are the large territory of the Bodoquena Plateau and many of these

species had been collected in the southern part, region not sampled by the projects. Furthermore, the projects sample sites, like the other previous studies (Souza 2003, Dalzochio et al. 2011a, b), focused on lotic system rather lentic ones, such as lakes and reservoirs. Thus, future inventories in lentic environments and with other sampling methods (e.g. visual record, Malaise trap, light trap) may still increase the species records for Bodoquena Plateau, highlighting the importance of this region, which lies into two highly threatened biomes.

Our new records extend the register of distribution to many species, information considered critical for the definition of their threatened status (IUCN 2016). When considering the IUCN red list, the Odonata species of the Neotropical region have a high number of species listed as Data Deficient (Clausnitzer et al. 2009) or without status definition. In this study, 2/3 of the species do not have classification, which reinforces this information gap related to conservation for the group. Regarding the species classified as threatened, *Elga newtonsantosi* and *Micrathyria pseudhypodidyma* have limited information available about their distribution (number of locations), population size, and ability to survive in reduced habitat (von Ellenrieder 2009b, c). From a conservation perspective, the knowledge about threatened species distributions is crucial for biodiversity management, especially for the development and implementation of conservancy plans. Thus, both of them shall be targets of governmental protection plan, as required in the Brazilian legislation on endangered species. In summary, this study highlighted the Bodoquena Plateau as an important habitat for odonates, including species classified as threatened.

Chapter 3. DNA barcoding of odonates from the Upper Plata basin: database creation and genetic diversity estimation

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Abstract

We present a DNA barcoding study of Neotropical odonates from the Upper Plata basin, Brazil. A total of 38 species were collected in a transition region of "Cerrado" and Atlantic Forest, both regarded as biological hotspots, and 130 cytochrome c oxidase subunit I (COI) barcodes were generated for the collected specimens. The distinct gap between intraspecific (0-2%) and interspecific variation (15% and above) in COI, and resulting separation of Barcode Index Numbers (BIN), allowed for successful identification of specimens in 94% of cases. The 6% fail rate was due to a shared BIN between two separate nominal species. DNA barcoding, based on COI, thus seems to be a reliable and efficient tool for identifying Neotropical odonate specimens down to the species level. These results underscore the utility of DNA barcoding to aid specimen identification in diverse biological hotspots, areas that require urgent action regarding taxonomic surveys and biodiversity conservation.

Introduction

Odonata in the Neotropics is represented by about 1,700 recognized species, encompassing more than a quarter of the total dragonfly fauna on earth (von Ellenrieder 2009d). Much like in other taxonomic groups, the true extent of this diversity is still unknown and it has been estimated that at least 25% of the species that inhabit this region have not yet been described (Kalkman et al. 2008). Despite of its exceptional species richness, the Neotropical fauna is still less understood than the other geographical regions (Kalkman et al. 2008), mostly due to the vast diversity and limitations related to identification. Importantly, only a limited number of taxonomic keys are available for Neotropical odonates (especially for larval forms). In addition, the

conspicuous paucity of molecular data for odonate taxa from the region creates a barrier for the use of molecular identification tools, such as DNA barcoding.

Since the advent of zoological DNA barcoding using cytochrome *c* oxidase subunit I (COI) (see Hebert et al. 2003a), more than 5 million sequences belonging to 240 thousand species have been registered in the Barcoding of Life Data system (BOLD), in an effort to coordinate a standardized reference sequence library for all eukaryotes (Ratnasingham & Hebert 2007). BOLD currently holds specimen records and related COI sequences for 887 different taxonomic labels (i.e., putative species) of Odonata.

The efficiency of DNA barcoding in identifying unknown specimens has already been realized for various terrestrial arthropod taxa (e.g. Fisher & Smith 2008, Janzen et al. 2009, Smith et al. 2009). In addition, various aquatic insects also seem amenable to identification via barcoding, as demonstrated by over 90% success rate for identification for different groups (e.g. Zhou et al. 2009). For Odonata species, COI databases contain information from several geographically distinct regions, such as Africa, Asia, and Europe (see Bergmann et al. 2013, Carle et al. 2015, Kim et al. 2014a). Previous evaluations of the adequacy of DNA barcoding in identifying odonate specimens suggest an accuracy above 95% for the group (e.g. Bergmann et al. 2013). Thus, DNA barcoding seems to be an effective instrument to assist biological studies of odonate taxa. However, accurate and effective specimen identification is fully contingent on the development of a robust database of comparative data, against which newly gathered data can be compared. Moreover, accurate barcoding-based identification also assumes a distinct gap between the highest intraspecific variation and the lowest interspecific divergence – a region that is commonly termed the "barcoding gap" (see Meier et al.

2008, Wiemers & Fiedler 2007). These contingencies remain largely unexplored for Neotropical odonates.

The "Cerrado" (Brazilian savanna physiognomies) and Atlantic forest, two of the world's biological "hotspots" (Myers et al. 2000, Mittermeier et al. 2005), have been recognized for their high biodiversity, yet several anthropogenic threats exist that may affect this diversity (Klink & Machado 2005, Ribeiro et al. 2009) and taxonomic knowledge for several groups in the region is still limited (e.g. Borges et al. 2015, De Marco & Vianna 2005, Vivo et al. 2011). These factors raise the importance of developing a system whereby access to information regarding conservation status and biomonitoring of species can be increased. This is especially compelling given the rapid decrease of professional taxonomists in Brazil (Vogel Ely et al. 2017).

In the present study, we build a DNA barcode reference library for a subset of the odonate diversity from the “Cerrado” and Atlantic forest regions of the Upper Plata basin, and evaluate whether or not a DNA barcoding strategy can be used to identify specimens of Odonata that occur in the region (based on a presence of a barcoding gap). Such a study may provide important data for ecology and taxonomy of Neotropical odonates, considering that members of the group are widely used as bioindicators of environmental changes in both of these ecoregions (Monteiro Júnior et al. 2015, Valente-Neto et al. 2016).

Methods

Specimen sampling and taxonomy

Odonate samples were collected from 27 streams of the Upper Plata basin in the state of Mato Grosso do Sul and 1 stream from the municipality of Cascavel, Paraná state, Brazil (Fig 3.1 and Table 3.1). Native vegetation in the collection areas is composed of

a mosaic of “Cerrado” and Atlantic Forest. In total, more than 500 individuals were collected, in an area of about 40,000 square kilometers. Morphological identification of all specimens was accomplished using the identification keys of Garrison et al. (Garrison et al. 2006, 2010), Lencioni (Lencioni 2005, 2006) and Heckman (Heckman 2006, 2008) with the assistance of experts in odonate taxonomy from the National Museum (MNRJ, Rio de Janeiro, Brazil) and the National University of Avellaneda (Avellaneda, Argentina). For classification, we followed Dijkstra et al. (Dijkstra et al. 2013) and for scientific names, we followed the list presented by Garrison & von Ellenrieder (2016). All specimens were collected in accordance with Brazilian law under a permanent scientific collection license (SISBIO license number 6896-1 and 54388-1). Morphological vouchers were deposited in the collections of the Museum of Zoology, Universidade Federal de Mato Grosso do Sul, Brazil (CGMS / UFMS).

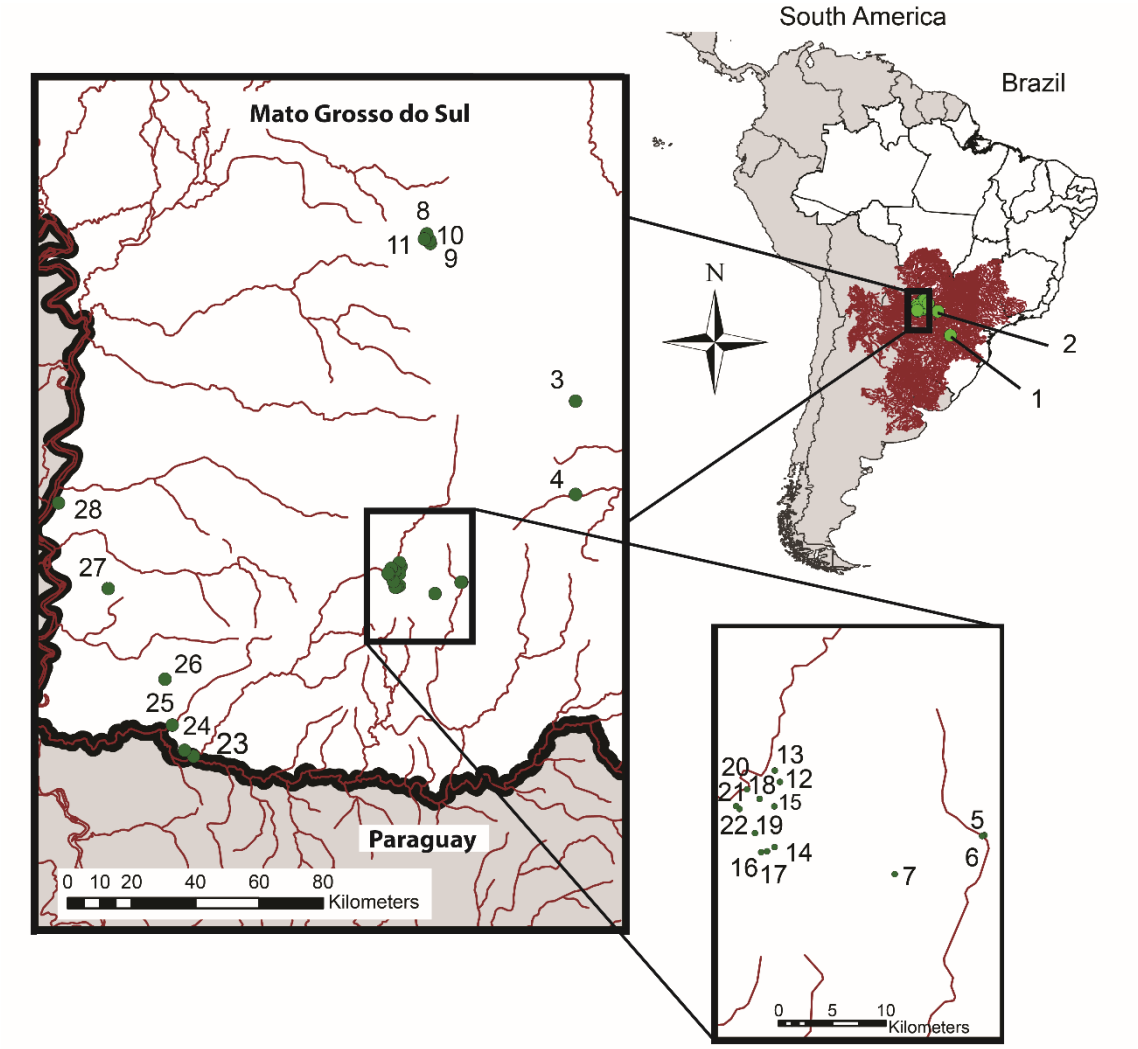

Fig 3.1. Geographical location of the sampling sites for Neotropical odonate taxa in Brazil. Red lines are rivers from the Plata basin.

Table 3.1. Collection sites from the Upper Plata basin.

Number	Country	State	Municipality	Exact site	Latitude	Longitude
1	Brazil	Parana	Cascavel	Rio das Antas	-25.2607	-53.3653
2	Brazil	Mato Grosso do Sul	Dourados	Córrego Azulão	-22.2	-55.18
3	Brazil	Mato Grosso do Sul	Bonito	Córrego Cabana	-21.1706	-56.4414
4	Brazil	Mato Grosso do Sul	Jardim		-21.433	-56.442
5	Brazil	Mato Grosso do Sul	Bela Vista	Rio Margarida	-21.6799	-56.7624
6	Brazil	Mato Grosso do Sul	Bela Vista	Córrego Feio	-21.6805	-56.7643
7	Brazil	Mato Grosso do Sul	Alto Caracol	Rio Divisa	-21.7125	-56.8377
8	Brazil	Mato Grosso do Sul	Bodoquena	Córrego Nascente da Gruta	-20.7267	-56.8509
9	Brazil	Mato Grosso do Sul	Bodoquena	Córrego Ouro Verde	-20.7172	-56.8529

10	Brazil	Mato Grosso do Sul	Bodoquena	Córrego Oco do Sapo	-20.7	-56.8608
11	Brazil	Mato Grosso do Sul	Bodoquena	Córrego da Casa	-20.7141	-56.8678
12	Brazil	Mato Grosso do Sul	Alto Caracol	Córrego Sacuri	-21.6352	-56.9338
13	Brazil	Mato Grosso do Sul	Alto Caracol	Rio Espinilho	-21.6255	-56.9381
14	Brazil	Mato Grosso do Sul	Alto Caracol	Córrego da Laje	-21.6897	-56.9382
15	Brazil	Mato Grosso do Sul	Alto Caracol	Córrego da Estrada	-21.6557	-56.9384
16	Brazil	Mato Grosso do Sul	Alto Caracol	Córrego das Pedras	-21.6933	-56.9445
17	Brazil	Mato Grosso do Sul	Alto Caracol	Córrego Coqueiro	-21.6941	-56.9495
18	Brazil	Mato Grosso do Sul	Alto Caracol	Córrego do Cachorro	-21.6494	-56.9508
19	Brazil	Mato Grosso do Sul	Alto Caracol	Córrego Morro do Cateto	-21.678	-56.9546
20	Brazil	Mato Grosso do Sul	Alto Caracol	Rio Perdido	-21.6413	-56.9614
21	Brazil	Mato Grosso do Sul	Alto Caracol	Córrego da Volta	-21.6577	-56.9676
22	Brazil	Mato Grosso do Sul	Alto Caracol	Córrego Sujo	-21.6554	-56.9704
23	Brazil	Mato Grosso do Sul	Porto Murtinho	Córrego APA	-22.1702	-57.5183
24	Brazil	Mato Grosso do Sul	Porto Murtinho		-22.1536	-57.5435
25	Brazil	Mato Grosso do Sul	Porto Murtinho	Córrego Jango Fundo	-22.0824	-57.5785
26	Brazil	Mato Grosso do Sul	Porto Murtinho	Córrego Cristalino	-21.9535	-57.5991
27	Brazil	Mato Grosso do Sul	Porto Murtinho		-21.6981	-57.7586
28	Brazil	Mato Grosso do Sul	Porto Murtinho	Córrego Pão de Açúcar	-21.4572	-57.8989

For 130 samples, total genomic DNA was isolated from median legs of adults (n=127) and larvae (n=3) using a DNeasy tissue kit (Qiagen, Valencia, CA) according to manufacturer's instructions. A fragment of approximately 658 basepairs (bp) of the 5'-end of the mitochondrial cytochrome *c* oxidase subunit I (COI) gene was amplified by polymerase chain reaction using the M13-tailed primers ODOF1_T1 and ODOR1_T1 . Primers C_LepFolF, MLepF1, MLepR2 and C_LepFolR were also used for five specimens (Hajibabaei et al. 2006, Hebert et al. 2013, Hernández-Triana et al. 2014). DNA sequencing was performed at the Canadian Centre for DNA Barcoding (CCDB). Briefly, PCR products were labeled with BigDye Terminator v.3.1 Cycle Sequencing Ready Reaction kit (Applied Biosystems) according to the manufacturers protocol (CCDB) and were bi-directionally sequenced using an ABI3730 sequencer (Thermo Fisher Scientific). Data for successfully sequenced specimens were uploaded

to the Barcoding of Life Datasystem (BOLD: http://www.boldsystems.org) and several of the analyses were also performed using the online tools provided in this system. The sequence data and trace files were also uploaded to GenBank (accession numbers KY947357 to KY947486).

Analyses

Intraspecific and interspecific divergence estimates for the sequenced COI region were calculated using the 'Barcode Gap Analysis' tool in BOLD, employing the Kimura-2-Parameter (K2P) distance metric. The K2P model is herein used to allow for comparability between this and other barcoding studies (e.g. Hawlitschek et al. 2016, Hendrich et al. 2015) but see Srivathsan and Meier (2012) for an alternative view of the use of K2P distances. The alignment of DNA sequences was performed using MUSCLE (Edgar 2004), applying default settings. As a supplement to the BOLD analyses, mean and maximum genetic divergence values were calculated in MEGA 7.0 (Kumar et al. 2016) and employed identical conditions to those of the BOLD system (BOLD does not allow for these calculations). To visualize the distance in a tree-based setting, a neighbor-joining (NJ) tree was constructed in BOLD using mid-point rooting. The 'BIN Discordance' analysis in BOLD was used to reveal anomalies: both separate species that share a Barcode Index Number (BIN) and the same species when assigned to multiple, separate BINs. A BIN (Ratnasingham & Hebert 2013) is a globally unique identifier for "species" based on DNA barcodes. As summarized by Hendrich et al. (2015), the BIN system involves a 3-step online pipeline, which clusters similar barcode sequences algorithmically into operational taxonomic units (OTUs) and each "disagreement/conflict" case is the starting point for re-evaluation of molecular and/or morphological data.

As a complement to the BIN analyses, the empirical K2P values associated with intraspecific and interspecific comparisons were plotted against each other following the methods detailed in Kvist (2016). This was performed as a second tier of evincing and visualizing any potential barcoding gap.

Results

A total of 130 COI sequences were generated for the 38 species collected (S3 Table). In all but four cases, COI sequences were generated for multiple individuals that were identified to the same species. A single COI sequence was obtained for *Diastatops obscura* (Fabricius, 1775) (BOLD:AAY5948), *Gynacantha* sp. (BOLD:ACA3440), *Mnesarete smaragdina* (Selys, 1869) (BOLD:AAY6023) and *Argia chapadae* Calvert, 1909 (BOLD:AAY5929).

All hypothesized species, based on morphological examinations, also formed distinct clusters in the NJ tree (Fig 3.2 and S4 Fig), supporting their distinctness from other taxa. At the taxonomic level of genus, the NJ tree shows concordance with currently accepted classifications, with species in the same genus clustering together.

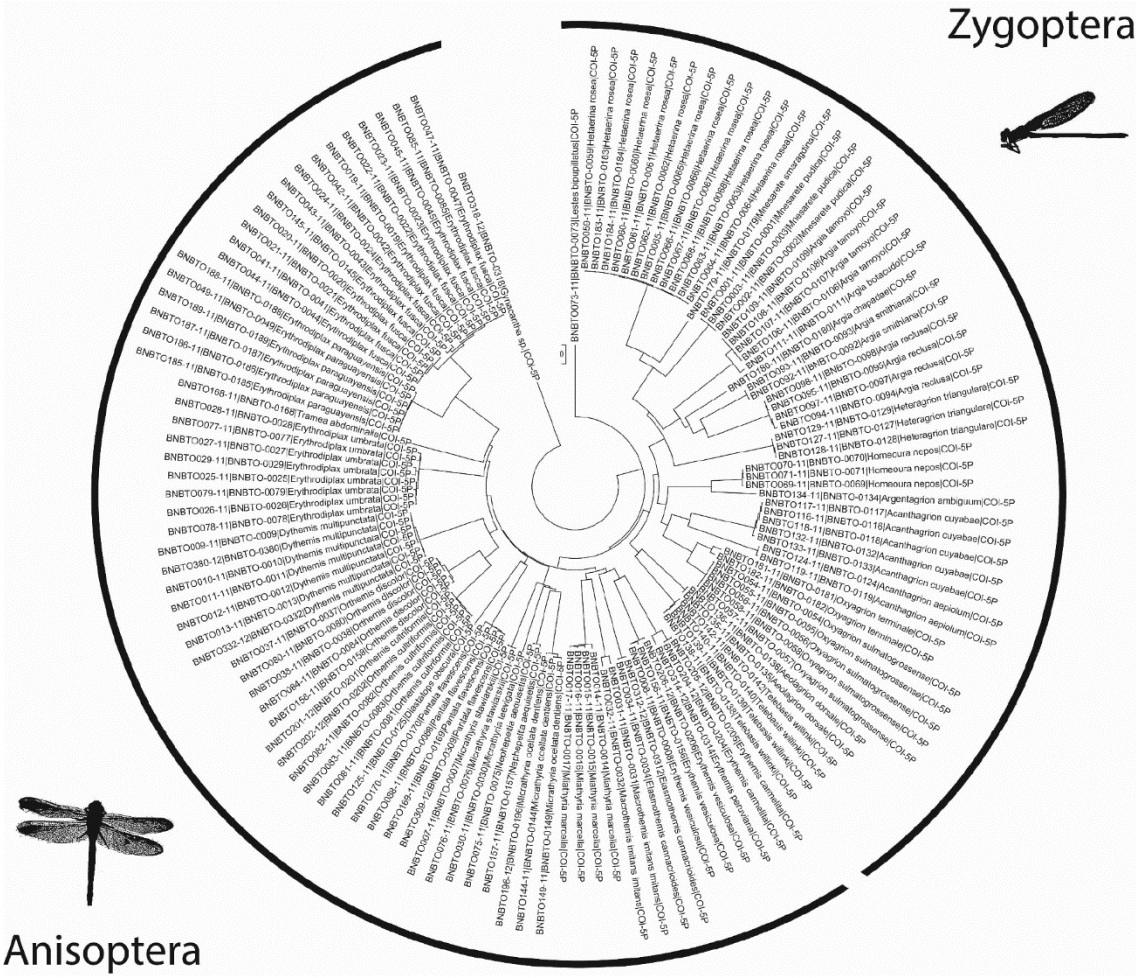

Fig 3.2. Mid-point rooted Neighbor-joining tree based on COI sequences for the entire dataset of Neotropical odonates.

Intraspecific genetic divergence based on K2P distances ranged from 0 to 1.86% (Table 3.2), with an average of 0.38% ± 0.02% (mean ± standard deviation). For some species, such as *Hetaerina rosea* Selys, 1853 (*n* = 12) and *Orthemis cultriformis* Calvert, 1899 (*n* = 5), all haplotypes were found to be very similar (0.07% ± 0.07 and 0.09% ± 0.07 average sequence divergence, respectively) even though relatively more individuals were included in the analysis. Comparatively higher maximum intraspecific distances were found in some other species, e.g. 1.86% in *Erythrodiplax fusca* (Rambur, 1842) and *Macrothemis imitans imitans* Karsch, 1890. Interspecific genetic divergence in the entire dataset ranged from 1.54% to 30.48%, with a mean of 21.12% ± 4.01. Low

levels of minimum interspecific divergence typically occurred between closely related species (Table 3.2), such as *Argia botacudo* Calvert, 1909 and *Argia tamoyo* Calvert, 1909 (1.54%), *Erythemis carmelita* Williamson, 1923 and *Erythemis peruviana* (Rambur, 1842) (2.33%), and *Oxyagrion sulmatogrossense* Costa, de Souza & Santos, 2000 and *Oxyagrion terminale* Selys, 1876 (4.89%). Consequently, a few intraspecific and interspecific genetic divergence comparisons overlapped in a short section of the ranges (1.54-1.86%). Only the interspecific genetic divergence values between *A. botacudo* and *A. tamoyo* (Fig 3.3) were recovered below 2%, a value that has become semi-standardized for the upper limit of intraspecific variation.

Table 3.2. K2P distances of COI within species studied. BIN, Barcode Index Number, an identification number for barcoding clusters recognized by BOLD within the species; N, number of barcode sequences; Mean(%) =average of intraspecific genetic distance value (expressed as percent); Max(%) = maximum intraspecific genetic distance value (expressed as percent); Nearest neighbour = most closely related species retrieved in the NJ tree. DNN = lowest genetic distance to the nearest neighbor (expressed as percent).

Suborder and Family	Species	BIN (BOLD)	N	Mean (%)	Max (%)	Nearest neighbour	DNN (%)
Anisoptera							
Libellulidae							
	Diastatops obscura	AAY5948	1	N/A	N/A	*Pantala flavescens*	15.69
	Dythemis multipunctata	AAY5938	7	0.15	0.3	*Orthemis cultriformis*	13.46
	Elasmothemis cannacrioides	AAY7421	2	0.15	0.15	*Miathyria marcella*	16.48
	Erythemis carmelita	ACA0824	2	0	0	*Erythemis peruviana*	2.33
	Erythemis peruviana	ACA0824	1	N/A	N/A	*Erythemis carmelita*	2.33
	Erythemis vesiculosa	AAY5962	3	0.41	0.46	*Erythrodiplax umbrata*	14.21
	Erythrodiplax fusca	AAY5966	14	0.9	1.86	*Erythrodiplax paraguayensis*	7.45
	Erythrodiplax paraguayensis	AAY5970	6	0.15	0.46	*Erythrodiplax fusca*	7.45
	Erythrodiplax umbrata	AAG7268	7	0.83	1.39	*Orthemis discolor*	14.02
	Macrothemis imitans imitans	AAY5839	2	1.86	1.86	*Miathyria marcella*	16.05
	Miathyria marcella	AAE3343	4	0.62	0.92	*Aeolagrion dorsale*	14.56
	Micrathyria laevigata	AAY5838	1	N/A	N/A	*Nephepeltia aequisetis*	14.05
	Micrathyria ocellata	AAY5968	3	0.41	0.61	*Nephepeltia aequisetis*	12.6

		Micrathyria stawiarskii	AAY5779	2	0	0	*Nephepeltia aequisetis*	13.23
		Nephepeltia aequisetis	AAY6185	2	0.46	0.46	*Micrathyria ocellata*	12.6
		Orthemis cultriformis	AAY7423	5	0.09	0.15	*Orthemis discolor*	9.42
		Orthemis discolor	AAY7422	5	0.58	0.92	*Orthemis cultriformis*	9.42
		Pantala flavescens	AAH6890	4	0.71	0.92	*Diastatops obscura*	15.69
		Tramea abdominalis	AAY5969	1	N/A	N/A	*Erythrodiplax umbrata*	15.1
	Aeshnidae							
		Gynacantha sp.	ACA3440	1	N/A	N/A	*Lestes bipupillatus*	17.84
Zygoptera								
	Calopterygidae							
		Hetaerina rosea	AAY5702	12	0.07	0.15	*Mnesarete smaragdina*	12.25
		Mnesarete pudica	AAY6022	3	0	0	*Mnesarete smaragdina*	12.76
		Mnesarete smaragdina	AAY6023	1	N/A	N/A	*Hetaerina rosea*	12.25
	Coenagrionidae							
		Acanthagrion aepiolum	ABX9825	2	0.31	0.31	*Acanthagrion cuyabae*	15.02
		Acanthagrion cuyabae	AAY7620	5	0.31	0.61	*Acanthagrion aepiolum*	15.02
		Aeolagrion dorsale	AAY7616	2	0	0	*Telebasis willinki*	12.91
		Argentagrion ambiguum	AAY5710	1	N/A	N/A	*Homeoura nepos*	8.24
		Argia botacudo	AAY5928	1	N/A	N/A	*Argia tamoyo*	1.54
		Argia chapadae	AAY5929	2	N/A	N/A	*Argia reclusa*	12.62
		Argia reclusa	AAY5926	4	0.41	0.77	*Argia smithiana*	12.54
		Argia smithiana	AAY5925	2	0.15	0.15	*Argia reclusa*	12.54
		Argia tamoyo	AAY5928	4	0	0	*Argia botacudo*	1.54
		Homeoura nepos	AAY5711	3	0.1	0.15	*Argentagrion ambiguum*	8.24
		Oxyagrion sulmatogrossense	AAY7411	5	0	0	*Oxyagrion terminale*	4.89
		Oxyagrion terminale	AAY6021	2	1.54	1.54	*Oxyagrion sulmatogrossense*	4.89
		Telebasis willinki	AAY7454	4	0.23	0.31	*Aeolagrion dorsale*	12.91
	Heteragrionidae							
		Heteragrion triangulare	AAY6230	3	0.1	0.15	*Argia chapadae*	19.1
	Lestidae							
		Lestes bipupillatus	AAY5814	1	N/A	N/A	*Orthemis discolor*	14.59

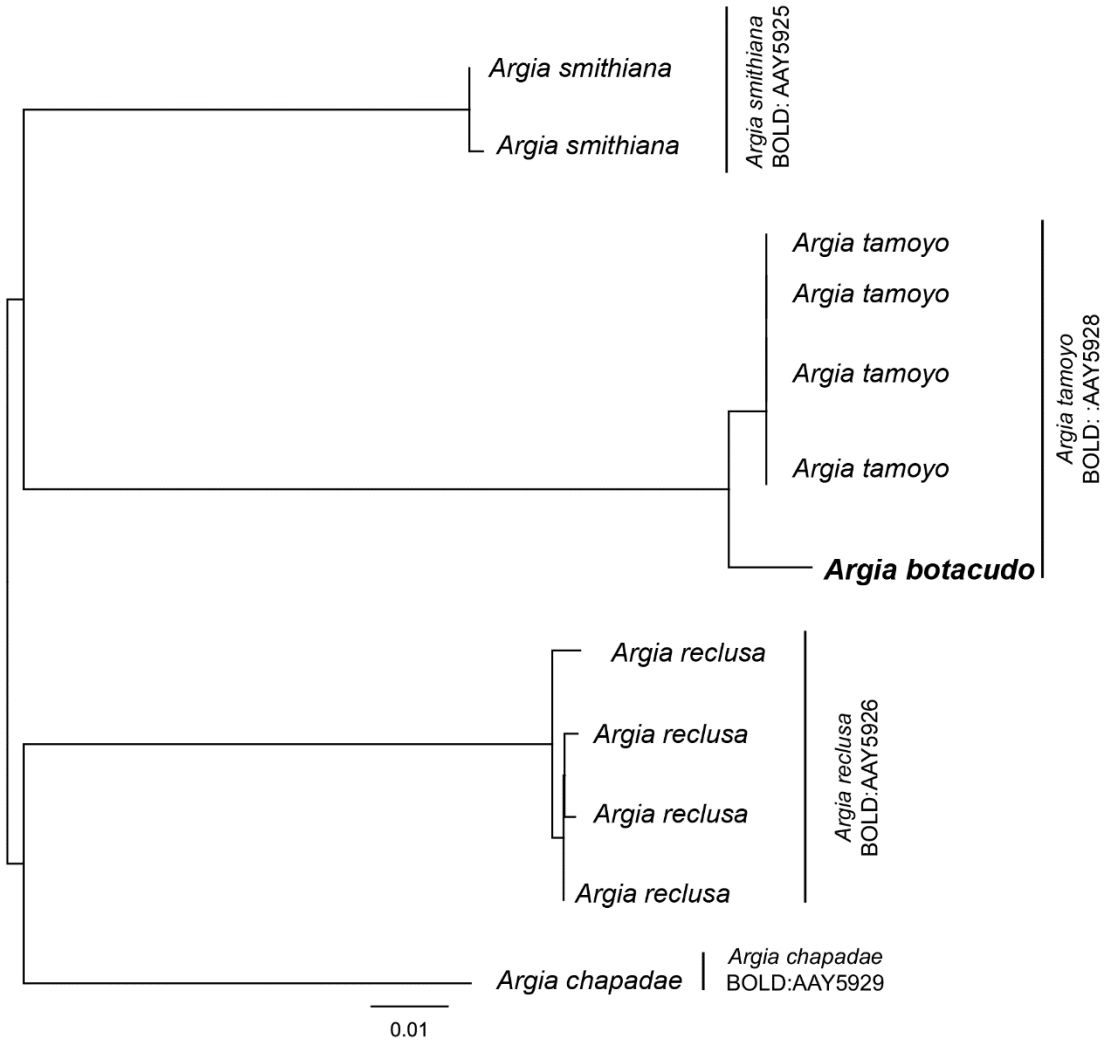

Fig 3.3. Subset of the neighbor-joining tree from Fig 3.2 showing the case of discordance between current taxonomy and BINs. Sequences of *Argia tamoyo* shares a BIN with those of *Argia botacudo*.

In total, 30 out of the 38 species were represented by one BIN. Eight species presented issues regarding their assignment into BINs, with four of them nested within BINs including taxa from other genera, as follows: *Dythemis multipunctata* Kirby, 1894 nested with *Antidythemis* sp. (BOLD:AAY5938), *Argentagrion ambiguum* Ris, 1904 with *Homeoura* sp. (BOLD:AAY5710) and *Erythemis carmelita* Williamson, 1923 and *Erythemis peruviana* Rambur, 1842 nested with *Dythemis* sp. (BOLD:ACA0824). That

is, whereas BINs should be unique for each species, in these cases specimens assigned to different genera share the same BIN.

Unfortunately, we were unable to test of veracity of taxonomic identifications of non-publicly available specimens. The only publicly available sequence was for a specimen identified as *Homeoura* sp. (BOLD ID GMAR1059) which nested together with our *A. ambiguum* sequence (BOLD:AAY5710), having a molecular divergence of 0.92%. Oddly, two species from our database (*E. carmelita* and *E. peruviano*) also share the same BIN (BOLD:ACA0824), despite interspecific variation of 2.33% (Table 3.2 and S4 Fig).

For the other four species – *Elasmothemis cannacrioides* (Calvert, 1906), *Lestes bipupillatus* (Calvert, 1909), *Argia tamoyo* and *Argia botacudo* – the BINs include more than one species of the same genus. But, in each instance, the species in question are closely related and presumably difficult to distinguish morphologically. *Elasmothemis cannacrioides* nested within *Elasmothemis rufa* De Marmels, 2008 (BOLD:AAY7421), *Lestes bipupillatus* within *Lestes forficula* Rambur, 1842 (BOLD:AAY5814), and *A. tamoyo* within *A. botacudo* (BOLD:AAY5928). It is worth noting that *E. rufa* and *L. forficula* sequences are not available publicly, but appeared in the 'BIN Discordance' results.

Because we were only able to test of veracity of taxonomic identifications of specimens from our database, we are confident that only one of six discordant BINs consists of multiple species (BOLD:AAY5928). If we assume no taxonomic errors in the sequences deposited, the overall success rate for identifying specimens across the dataset decreases from 94% to 79%.

Empirical values for the interspecific and intraspecific divergences were plotted against each other to visualize the size and range of any potential barcoding gap. Fig 3.4

shows a clear separation of intraspecific and interspecific distances, except for the few comparisons that fell within the overlap range. Intraspecific comparisons typically ranged between 0-2% whereas interspecific divergences were normally greater than 15%. Only a few interspecific comparisons fell within the 5-10% range. As previously noted, the only interspecific comparison that fell within the range typically expected for intraspecific variation was between *Argia botacudo* and *A. tamoyo*. This might suggest insipient speciation, with the distance values expected to grow in the absence of hybridization among populations.

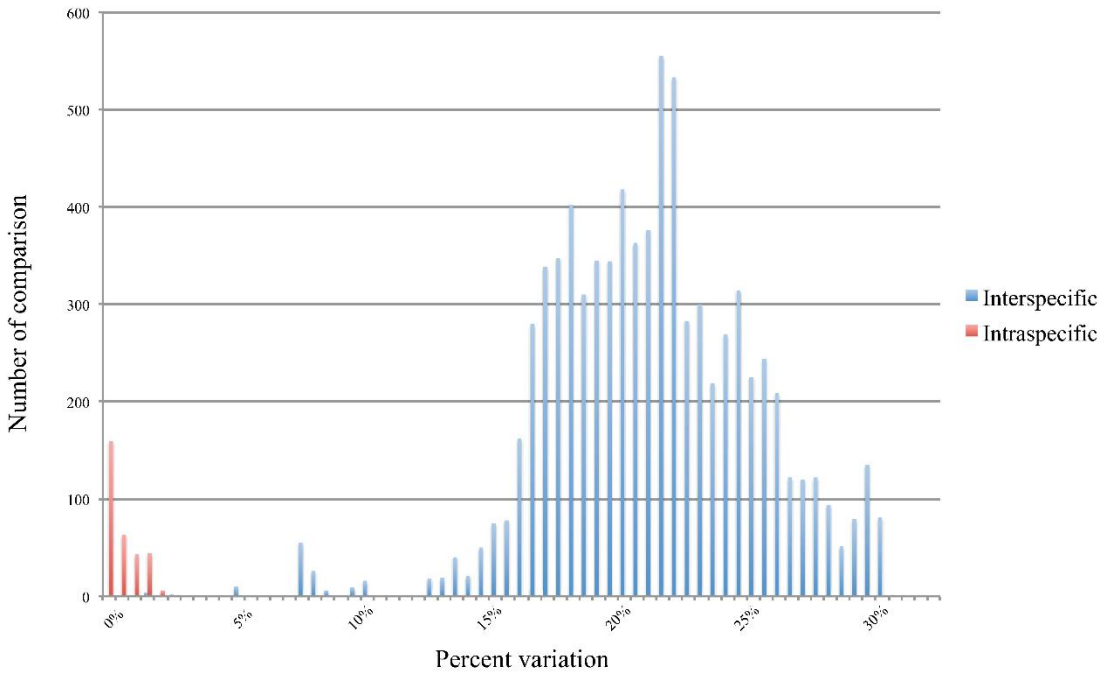

Fig 3.4. Frequency distribution of intraspecific (red) and interspecific (blue) genetic divergence in the sampled Neotropical odonates. Pairwise genetic distances were calculated using Kimura two-parameter (K2P) distances (see text for further details).

Discussion

Based on the separation of specimens into exclusive BINs with identical taxonomic labels, the overall DNA barcoding success rate of specimen identification for our odonate database ranged from 79% to 94%, depending on whether or not dubious taxa were included in the calculations. It is possible that these dubious taxa are represented by problematic taxonomic identifications (i.e., species ID's). However, it is worth noting that we did not have the possibility to examine the vouchers and there is only limited information available for the specimens deposited.

The success rate conveyed herein are comparable to the rates recorded for other, non-Neotropical odonates. For previously published, isolated odonate datasets, the percentage reached up to 95% (Bergmann et al. 2013). This number is also either relatively high or on par with that of other arthropod orders, where rates have been shown to be 63% for beetles (Hendrich et al. 2015) , 72% for spiders (Slowik & Blagoev 2012), 91.5% for true bugs (Raupach et al. 2014), 96.2% for black flies (Pramual & Adler 2014) and up to 100% for mosquitoes (Chan et al. 2014). The lower ranges of this spectrum may reflect the relative difficulty of inferring species-level identifications, such that unexpectedly high intraspecific distances may be the result of misidentifications and presence of cryptic species. This has already been discussed for other organismal groups, such as earthworms (Kvist 2016) and fishes (Knebelsberger et al. 2014, Díaz et al. 2016).

Despite of the implemented minimum quality criteria for barcode data, the presence of misidentifications of reference specimens is becoming an important factor in understanding error rates in specimen identifications throughout the BOLD system. Such issues can be exemplified for the discordant BIN BOLD:AAY5710, where a sequence from a specimen identified as *Homeoura* sp. (BOLD ID GMAR1059) nested

together with our *Argentagrion ambiguum* sequence with less than 1% divergence (see discussion in Kvist [43]). A comparison of *A. ambiguum* with *Homeoura nepos* from our database shows a divergence of 8.24%, indicating that the taxonomic assignment of one of these specimens is indeed dubious; rigorous morphological examinations were undertaken to robustly infer the identity of the newly sequenced specimen.

Another barrier is the limited availability of larval descriptions and adequate identification keys to associate immatures with their corresponding adults, confirmed by the tendency of increasing type I and type II errors when using larval forms for DNA barcoding (Ko et al. 2013). DNA barcoding has been used to confidently associate aquatic and terrestrial life stages (Trivinho-Strixino et al. 2012) and here we were able to associate the larval form with its adult equivalent for one species, *Pantala flavescens* (Fabricius, 1798).

For the present study, the only case in which we can robustly infer that DNA barcoding does not reliably separate different nominal species due to low interspecific distance values was for the two *Argia* species, *A. tamoyo* and *A. botacudo*. We can confidently infer this because we performed morphological studies for both species and the sequences were generated from the specimens analyzed in the present study (as opposed to the remaining BIN mismatches that involved specimens previously deposited by other researchers). Members of *Argia* seem to have undergone recent diversification events (Pritchard 1982) and show signatures of speciation processes driven by sexual selection (Nava-Bolaños et al. 2016), which may, in part, explain the low interspecific genetic distance values that were recovered in comparisons between these species. Nevertheless, both *A. tamoyo* and *A. botacudo* present clear diagnostic morphological characters in the cercus and other reproductive structures (Lencioni 2005), indicative of separately evolving lineages (*sensu* De Queiroz 2007).

The present study also evinces a distinct barcoding gap between approximately 2% and 15% overall genetic divergence, with only a few comparisons (for taxa detailed above) placing within that range. The size and distribution of the gap unequivocally demonstrates the utility of DNA barcoding in identifying odonate taxa from the sampled region. However, prior to the full realization of this tool of identification, a rigorous comparative database needs to be created and the present study hopefully also aids in this respect.

Conclusion

We here provide authoritative barcodes for 38 Odonata species inhabiting the Neotropical ecozone – none of these species have previously been affixed with a DNA barcode from the studied region. We concede that this study merely scratches the surface of odonate diversity, in particular in the tropics, but that it also provides a platform on which to build a robust barcode database. Indeed, our included taxa represent over 50% of the known odonate diversity from the Bodoquena Plateau (Koroiva et al. 2016), but several other regions need to be exhaustively sampled before we can approach a true count of taxon diversity and a robust barcode database. Future research must be focused on evaluating other species and geographic regions in order to revalidate the method, not only at local scales (such as the present study) but for all species present in South America.

Data accessibility

Specimen and sequences data are publicly available from the Barcode of Life Database (BOLD, via DOI dx.doi.org/10.5883/DS-BNBTO) and from GenBank (accession numbers KY947357 to KY947486; information on the sequence data is also given in S3 Table).

Chapter 4. Estimating the barcoding gap in a global dataset of *cox1* sequences for Odonata: close, but no cigar

Sebastian Kvist is coauthor of this chapter.

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Abstract

We evaluated the extent of intraspecific and interspecific genetic distances for two highly diverse infraorders of Odonata: Anisoptera and Zygoptera. All cytochrome *c* oxidase subunit I sequences (*cox1*), the region chosen for zoological DNA barcoding, present in GenBank for each infraorder were downloaded and curated. For Anisoptera, the final dataset consisted of 2,961 individual *cox1* sequences for 536 species and the equivalent numbers for Zygoptera were 2,477 sequences for 497 species. More than 7 million individual genetic comparisons were made and the results indicated that there is a tendency towards a barcoding gap, but that the size of the gap may not be sufficient to robustly infer identities for some taxa. DNA barcoding may be of less use for some odonate taxa, perhaps pertaining to misidentifications in global databases. However, at local scales or with more confined taxonomical sampling, this tool may yet be beneficial in identifying these charismatic organisms.

Introduction

The presence of a gap between the highest intraspecific variation and the lowest interspecific divergence within a study group, termed the barcoding gap, is considered as a key condition in the use of cytochrome *c* oxidase subunit I (*cox1*) for rapid identification of unknown specimens by DNA barcoding efforts (e.g. Meyer & Paulay 2005, Wiemers & Fiedler 2007, Collins & Cruickshank 2013, Candek & Kuntner 2015). Hebert et al. (2003) demonstrated the broad utility of DNA barcoding across several different animal groups and suggested that, for insects, an upper limit threshold of 3% intraspecific distance indicated conspecificity, whereas values above 3% indicated multiple species. The authors also suggested a 2% threshold for several other animal groups. However, subsequent results in other groups of invertebrates do not confirm the

suitability of these thresholds, instead indicating that a distinct separation of intraspecific and interspecific distances may not be present (e.g. Funk & Omland 2003, DeSalle et al. 2005, Cognato 2006, DeSalle 2006, Vogler & Monaghan 2006, Kvist 2016, Sundberg et al. 2016).

The lack of a barcoding gap, and therefore a limit in identification capacity using a DNA barcoding approach for different taxa, has been attributed to three main factors: (i) rapid and/or recent radiation events, (ii) the presence of cryptic species and (iii) errors in the identification of deposited specimens. The first two factors will confound the morphological identification of unknown specimens due to the resulting paucity of diagnostic characters (see Carreras-Carbonell et al. 2005, Monaghan et al. 2006, Sun et al. 2012, Liu et al. 2016). Moreover, all three of the factors will confuse molecular identifications because of the lack of clear genetic boundaries and/or dissatisfactory databases (see Bickford et al. 2007, Jörger & Schrödl 2013, Ko et al. 2013). These three factors are linked to each other in more ways than one but perhaps the most concerning aspect is that they will all lead to misidentifications in local and global databases, which will have a negative effect on downstream analyses.

For dragonflies (Odonata: Anisoptera) and damselflies (Odonata: Zygoptera), the utility of *cox1* for specimen identifications has been positively inferred for taxa from several geographically distinct regions (such as Africa, Asia, and Europe; see Damm et al. 2010, Bergmann et al. 2013), with studies suggesting accuracies as high as 95%. Thus, DNA barcoding seems to be an effective tool to assist biological studies of odonate taxa, at least at non-global scales. By contrast, however, Casas et al. (2017) evaluated identification problems possibly related to the aforementioned three factors and found a lack of distinct and sufficiently sized barcoding gap in odonates from the Philippines.

Much like in other groups, there is a remarkable paucity of data for Odonata concerning the presence or absence of a barcoding gap at global scales and at higher taxonomic ranks (across all sequenced taxa, geographic regions and ecological niches). To shed light on the utility and suitability of this tool for specimen identification within odonate infraorders, the present study aims to comprehensively sample *cox1* sequences across Anisoptera and Zygoptera, scrutinize these for potential contaminations and other anomalies, and assess the presence or absence of a global barcoding gap among the taxa. Such an analysis would gain importance considering that members of the group are widely used as bioindicators of environmental changes (Monteiro Júnior et al. 2015, Valente-Neto et al. 2016) and considering the increasing use of molecular techniques in studies of species boundaries and species delimitation (Damm et al. 2010, Bergmann et al. 2013, Casas et al. 2017).

Methods

The general workflow used in this article follows that of Kvist (2016). Representatives of the odonate infraorders Zygoptera and Anisoptera were analyzed separately because of the putative differences in rates of genetic evolution in some families (Pritchard 1982, Ware et al. 2012). Cytochrome *c* oxidase subunit I sequences were downloaded on 05 March 2017 from GenBank by sending the results (in FASTA format) of the following search queries to separate files: ‘‘txid6962 [Organism:exp] cox1 [Gene]’’, ‘‘txid6962 [Organism:exp] co1 [Gene]’’, ‘‘txid6962 [Organism:exp] coi [Gene]’’, ‘‘txid50488 [Organism:exp] cox1 [Gene]’’, ‘‘txid50488 [Organism:exp] co1 [Gene]’’ and ‘‘txid50488 [Organism:exp] coi [Gene]’’. This resulted in 3,917 individual sequences for Anisoptera and 3,745 sequences for Zygoptera.

The datasets were further manipulated using Geneious v.8.1.7 (Kearse et al. 2012) in combination with Microsoft Excel (Microsoft Corporation, Redmond, WA). Aiming to enable comparisons of verified data, and to ensure intraspecific and interspecific comparisons, all unverified sequences were removed; i.e. those that included the term ‘‘UNVERIFIED’’, and so were sequences with imprecise taxonomic labels (e.g. ‘‘Gen.’’ and/or ‘‘sp.’’). Sequences with taxonomic labels including ‘‘cf.’’ or “nr.” were assumed to be correctly annotated. Note that these instances only composed a small fraction of the full dataset (n= 5, 0.2% of the Anisoptera dataset and n=5, 0.2% of the Zygoptera dataset). Full mitochondrial genomic sequences were removed as these were assumed to be already present in the dataset as simple *cox1* gene data, and sequences with a length below 400 nucleotides (nt) were also removed.

Potential contaminants were then controlled for by a BLASTn search of the *cox1* gene sequences against the non-redundant sequence database on GenBank. Ten sequences were removed because these found significant matches against bacteria, lepidopterans and dipterans during the BLASTn searches. Subsequent to these steps of curation, the dataset for Anisoptera included 2,961 individual sequences and that of Zygoptera included 2,477 sequences.

Target region and directionality

Firstly, the 5’-3’ direction of the sequences was confirmed by comparison to sequences that were previously determined to be in the correct direction (AB708566 *Aeshna crenata* for Anisoptera and KM383852 *Hetaerina vulnerata* for Zygoptera). This was controlled for via the direction plots visualized in MAFFT ver. 7 (Katoh & Standley 2013). Also, in order to increase robustness in the homology statement and elevate matrix occupancy, long sequences were truncated to cover only the “Folmer”

region of the *cox1* gene. This is the most commonly used region for DNA barcoding and covers 658 nt of the 5'-end of the gene. For odonates, the region can be amplified using the "Folmer" primer pair (HCO2198 and LCO1490; Folmer et al. 1994) and the truncation was carried out following the positioning of these primers using Mesquite ver. 3.11 (Maddison & Maddison 2016).

Genetic distances

MAFFT was used to align sequences within each of the datasets ("Anisoptera" and "Zygoptera") separately by employing the FFT-NS-1 strategy with a gap opening penalty of 3.0, the 200PAM/K =2 scoring matrix, and an offset value of 0.0. Uncorrected p-distances between each sequence pair were calculated in PAUP* ver. 4.0 (Swofford 2002), ignoring gaps for affected sites and with equal rates for variable sites. Microsoft Excel was used to split the information into bins for intraspecific and interspecific comparisons. The resulting files were managed in Microsoft Excel where genetic distances were rounded to the nearest 0.5 decimal (e.g. 0.6% was rounded to 0.5% and 0.75% was rounded to 1.0%) and graphs were created to visualize the results. Finally, as a complement to the manual calculations, we used the Automatic Barcode Gap Discovery (ABGD; Puillandre et al. 2012) software to check the distribution and size of a potential barcoding gap. ABGD was run for both datasets with the following settings: Pmin= 0.001, pmax=0.9, simple distances, number of bins=100.

As mentioned in Kvist (2016), this strategy does not take into account taxonomic synonyms, misidentifications or subsequent errata to the taxonomic labels, nor does it pretend to equalize global and local DNA barcoding gaps. That is, a local DNA barcoding gap may still be present even though a global gap shows insufficient size.

Results

The final Anisoptera dataset included 2,961 individual *cox1* sequences from 536 unique taxonomic labels (i.e., putative species; see Supplementary file, S5 Table) and the alignment occupied 658 sites. The Zygoptera dataset included 2,477 sequences from 497 unique taxonomic labels (see Supplementary S5 Table) and occupied 660 aligned sites.

Anisoptera

The genetic distance analysis of the full Anisoptera dataset relied on a total of 4,382,280 comparisons; 4,340,259 were interspecific comparisons and 42,021 were intraspecific comparisons (Table 4.1; S6 Table).

The average uncorrected p-distance ± standard deviation within the entire dataset was 17.01% ± 3.05; the average interspecific distance was 17.16% ± 2.65, whereas the average intraspecific distance was 1.60% ± 2.61 (Table 4.2). The interspecific distance values ranged from 0% - 30.09%, and the equivalent range for intraspecific distance values was 0% - 23.30% (Table 4.2). Finally, the median value for interspecific distances was 17.34% and, for intraspecific distances, the same value was 0.46%.

Zygoptera

For the zygopteran dataset, 3,066,526 comparisons were used as the basis for the genetic variation analysis; 2,974,753 were interspecific comparisons and 91,773 were intraspecific comparisons (Table 4.1; S7 Table).

Table 4.1. Results from the sequence curation steps performed for each of the two datasets.

Dataset	Sequences	Sequences after curation	Interspecific comparisons	Intraspecific comparisons	Average no. of intraspecific comparisons per unique taxonomic label
Anisoptera	3,917	2,961	4,340,259	42,021	78.39
Zygoptera	3,745	2,477	2,974,753	91,773	184.65

The average uncorrected p-distance ± standard deviation within the entire dataset was 17.39% ± 3.99; the average interspecific distance was 17.90% ± 2.73, whereas the average intraspecific distance was 0.66% ± 1.28 (Table 4.2).

Table 4.2. Results from the genetic variation analyses for each of the two datasets, including standard deviations. In all cases, uncorrected p-distances for the cox1 locus were used.

Dataset	Average variation (total)	Average interspecific distance	Average intraspecific distance	Range interspecific distances (%)	Range intraspecific distances (%)
Anisoptera	17.01%±3.05	17.16%±2.65	1.60%±2.61	0-30.09	0-23.30
Zygoptera	17.39%± 3.99	17.90%±2.73	0.66%±1.28	0-35.27	0-22.02

The interspecific distance values ranged from 0 to 35.27%, the intraspecific distance values ranged from 0 to 22.03% (Table 4.2), and the median value for interspecific and intraspecific distances was 18.08% and 0.42%, respectively.

Barcoding gap

The resulting graphs appear to indicate the presence of a barcoding gap between genetic distances of 2% and 7% (Fig 4.1A and 4.2A). However, when considering a closer view of this region, there is, in fact, no explicit barcoding gap, only a tendency towards a narrow gap (Fig 4.1B and 4.2B).

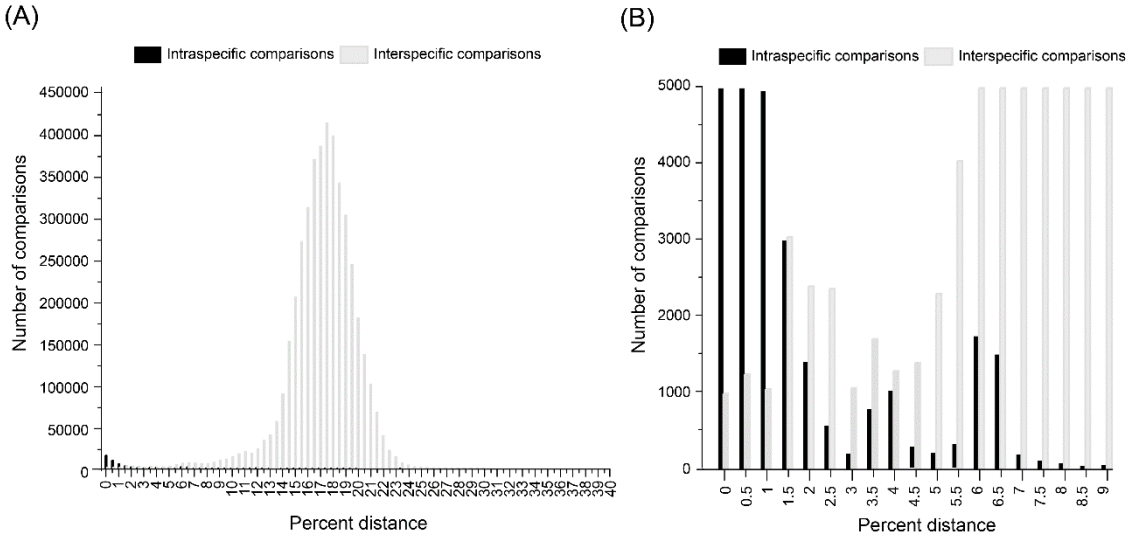

Fig 4.1. Plot of intraspecific (black) and interspecific (grey) *cox1* genetic distances within the 2,961-sequence Anisoptera dataset. (A) Full view of the chart with the y-axis set above the upper limit of the number of comparisons within the dataset; (B) enlarged view of the barcoding gap region with the y-axis set to a maximum of 5,000 comparisons.

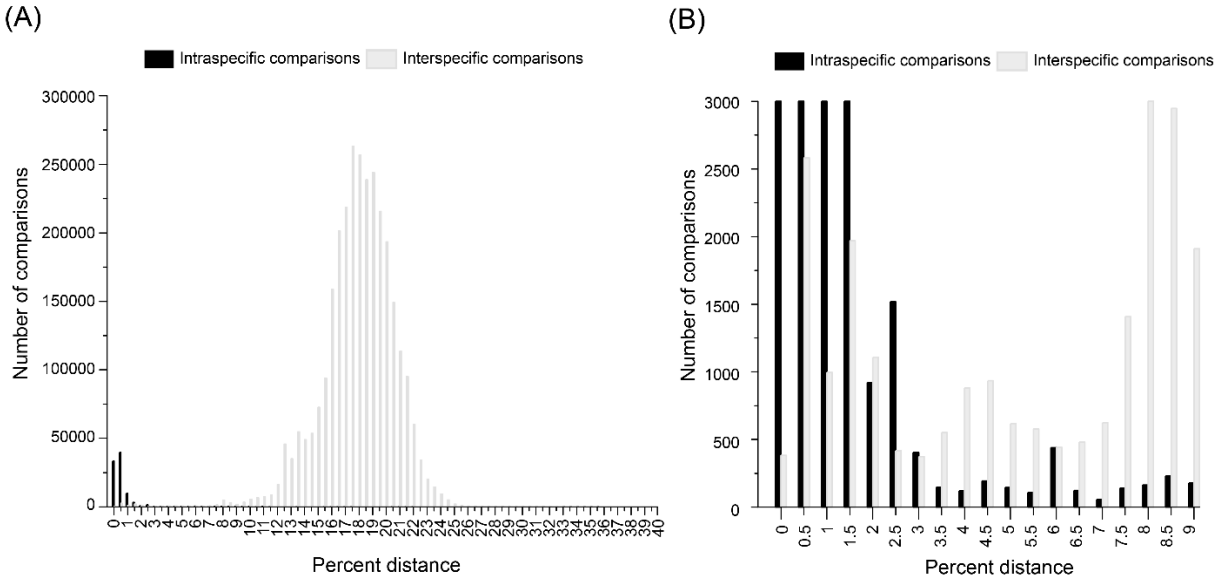

Fig 4.2. Plot of intraspecific (black) and interspecific (grey) *cox1* genetic distances within the 2,477-sequence Zygoptera dataset. (A) Full view of the chart with the y-axis set above the upper limit of the number of comparisons within the dataset; (B) enlarged view of the barcoding gap region with the y-axis set to a maximum of 3,000 comparisons.

For the Anisoptera dataset, fully 8,790 intraspecific comparisons (20.91% of all interspecific comparisons) from 94 species (17.53% of all Anisoptera species employed, S8 Table) show distance values above 2%, and 7,362 interspecific comparisons (0.16% of all interspecific comparisons) from 181 species (33.76% of all Anisoptera species employed) show values below 2%. Analysis of the Zygoptera dataset resulted in 4,910 intraspecific comparisons (5.35%) from 66 species (13.14%) showing equal to, or above, 2% divergence and 6,487 interspecific comparisons (0.28%) from 81 species (16.13%) showed less than 2% divergence.

When instead considering a 3% threshold for species delimitation, 7,608 intraspecific comparisons (18.10%) from 64 species (11.94%; S9 Table) show distance values above 3% in the Anisoptera dataset, and 11,581 interspecific comparisons (0.26%) from 219 (40.85%) species show values below 3%. Analysis of the Zygoptera dataset resulted in 2,623 intraspecific comparisons (2.85%) from 49 species (9.76%) showing 3% divergence or above and 7,592 interspecific comparisons (0.25%) from 99 species (19.72%) showed less 3% divergence.

It is worth mentioning that, for Anisoptera, 19 species presented interspecific distance values below the 2% threshold when compared to species of another genus, whereas for Zygoptera 4 species (S8 Table) showed the same levels of similarity for non-congeners. A total of 31 species of Anisoptera presented interspecific comparisons values below 3% when compared to species of another genus, and 6 species within Zygoptera showed the same (S9 Table).

The distance distribution resulting from the ABGD analysis of the Anisoptera dataset (Fig 4.3A) also suggests a tendency towards a gap between divergence estimations of 4–5%. However, ABGD agrees with the above calculations in that no distinct gap exists among the distances; again, the number of comparisons that show distances between 4% and 5% is greatly reduced but never reach zero. The ABGD analysis of the Zygoptera dataset suggests the presence of a gap between approximately 3%–7% (Fig 4.3B). However, much like with Anisoptera, a closer view of the region indicates that the number of comparisons never reaches zero (i.e., no distinct and sufficiently sized barcoding gap exists).

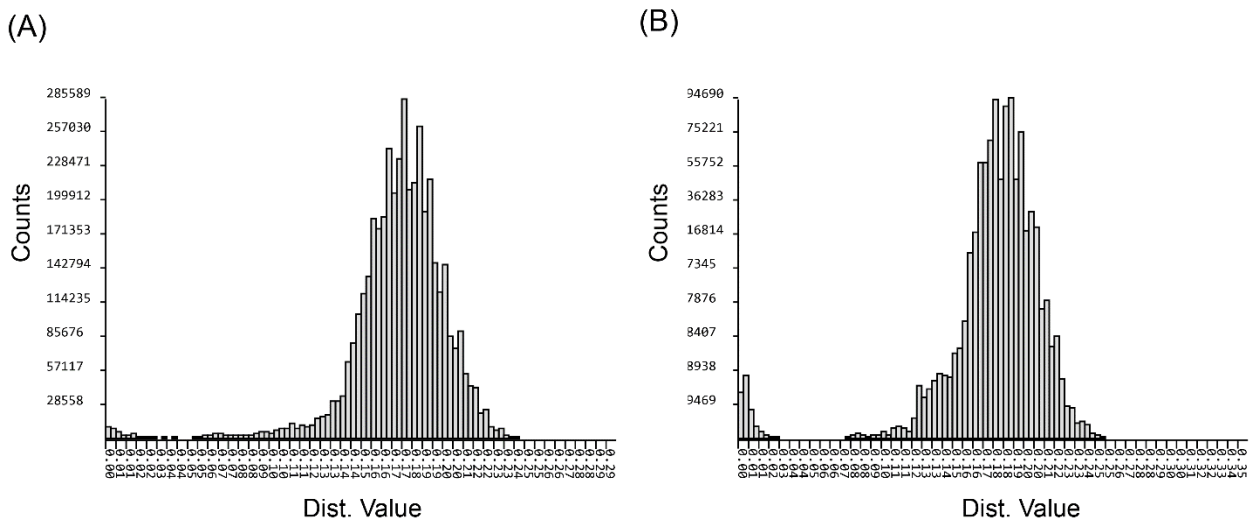

Fig 4.3. Results from the Automated Barcode Gap Discovery software (ABGD). (A) Anisoptera dataset and (B) Zygoptera dataset.

Discussion

Through a series of genetic comparisons from a global dataset of *cox1* sequences for odonate taxa, we show that there is a tendency towards a DNA barcoding gap at 4%-5% divergence in Anisoptera and 3%-7% in Zygoptera. However, nowhere is there a distinct and sufficiently sized gap that separates intraspecific and interspecific

divergence values. Instead, the "barcoding gap" is both too narrow to allow for robust separation of interspecific and intraspecific comparisons and, in all cases, the gap is flanked on both sides by interspecific and intraspecific comparisons. In an ideal setting, intraspecific divergence estimates would exclusively lie to the left of the barcoding gap in Fig 4.1 and 4.2, whereas the right side of the gap would be exclusively occupied by interspecific divergence values. In addition, the size of the gap would be large enough to clearly separate intraspecific divergence values from interspecific values and, as such, allow for inferences of potential conspecificity for any potential unidentified sample. The situation for odonates is not unique among animals; several other studies have shown similar results in tendencies towards, but not distinct, separation of intraspecific and interspecific divergence values (e.g. Ward 2009, Jörger et al. 2012, Nicolas et al. 2012, Kvist 2016, Sundberg et al. 2016). With recent advances in the scope of DNA barcoding projects, with datasets largely moving from local scales to global scales, a pattern seems to be emerging wherein DNA barcoding is shown to be useful for most, but not all, taxonomic groups (e.g. Meyer & Paulay, 2005, Kvist 2016, Sundberg et al. 2016). Indeed, this is most troublesome in groups containing taxa that are difficult to identify on morphological grounds and that, as a result, are often misidentified in data repositories. This problem also extends to cryptic species that will show high levels of intraspecific divergence, yet will likely share taxonomic labels with other species in sequence repositories (see Sánchez Herrera et al. 2010, Sánchez-Guillén et al. 2011, Yong et al. 2014).

This emerging pattern can be attributed to a number of different obstacles. Firstly, we cannot dismiss the potential of heterotachy across the taxonomic landscape, such that some species may be more prone to divergent changes in *cox1* than other taxa. Indeed, assuming no errors in identifications and sequencing, current results seem to

suggest greatly varying rates of change in *cox1* for different groups. Of course, the differences in accumulated changes can also be a product of the timing of cladogenetic events – younger clades have had less time to accumulate changes. Secondly, and perhaps less contingent on ad hoc solutions, the flanking on both sides of the barcoding gap by both interspecific and intraspecific divergence estimates, which can be seen for several animal groups, may merely be a result of erroneous identifications of the organisms (see Wiemers & Fiedler 2007, Gaikwad et al. 2017). For example, in the present study, assuming that identifications of taxa that show interspecific divergence values of below 3% when compared to non-conspecifics were erroneous would greatly increase the tendency towards a gap. The same, of course, would have to be assumed for taxa that share a taxonomic label but that show over 7% difference in their *cox1* sequences. However, even if all comparisons that show divergence below 2% were assumed to be intraspecific values and all comparisons above 2% were assumed to be interspecific divergence values, there is no clear and distinct gap present in our charts (Figs 4.1 and 4.2), suggesting that the lack of a barcoding gap is a function of several factors, one of them being incorrect identifications.

In reality, the lack of a barcoding gap may have negative effects on efforts to identify odonates based on DNA barcoding, as any unidentified individual may match conspecifics at the same level of *cox1* similarity as non-conspecifics. However, this seems to be troublesome only for a handful of taxa that show divergence values within the range of where a barcoding gap is normally found, or that show abnormally low interspecific distances and abnormally high intraspecific distances. The vast majority of the sequences employed by the present study behaved in a manner that is consistent with the assumptions of *cox1* variation in DNA barcoding theory – they show high divergence values when compared to other species and low values when compared to

conspecifics. It is also noteworthy that barcoding gaps can be present when targeting taxa at a more local scale (e.g. Nolan et al. 2007), as opposed to the global scale employed by the present study. Most of the genera in the present study that were represented by more than three species do not show distinct and sufficiently sized barcoding gaps (S8 Table and S9 Table). For example, the genera *Lestes* and *Aeshna* (see Fig 4.4A and 4.4B, respectively) would fall into this category. However, for some taxa, such as the Afrotropical genus *Lestinogomphus* (Fig 4.4C), our results verify the presence of a disjunction between intraspecific and interspecific distances. In other words, more geographically or taxonomically confined studies may still produce clear and sufficiently sized barcoding gaps for odonate taxa.

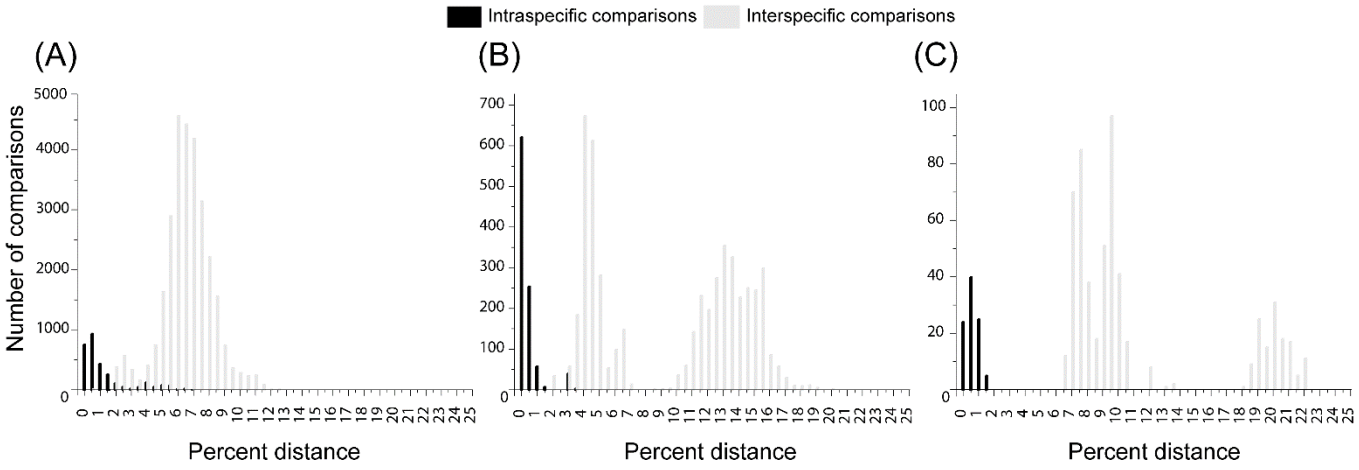

Fig 4.4. Plot of intraspecific (black) and interspecific (grey) *cox1* genetic distances within three genera: (A) *Aeshna* (Odonata: Anisoptera); (B) *Lestes* (Odonata: Zygoptera) and (C) *Lestinogomphus* (Odonata: Anisoptera). Note the absences of a disjunction between intraspecific and interspecific distances (the lack of a barcoding gap) for Aeshna and Lestes. By contrast, the presence of a barcoding gap is shown for Lestinogomphus. These results were extracted from the global dataset.

As an alternative to analyses of genetic distances between *cox1* sequences, the use of the character-based DNA barcoding methods have shown to be effective and seem to be a promising complement to evaluations of distance thresholds (Rach et al., 2008; Damm et al., 2010). As advocated by Bergmann et al. (2013), this method, which translates sequence information into diagnostic characters, can be applied to identify and discriminate species especially in the absence of a barcoding gap. Recent studies have also suggested that mitochondrial regions other than the *cox1* Folmer region may be more suitable for barcoding efforts of odonates as they show higher degrees of variation between species but are still consistently low for within-species comparisons. As an example, Damm et al. (2010) suggested the use of NADH dehydrogenase subunit I (*ND1*) in dragonfly barcoding because this locus shows a greater degree of divergence between species of dragonflies and its complementary use should be evaluated as a way to aid molecular identification. Also, Rach et al. (2017) suggested a similar situation for a largely unexplored region of the *cox1* locus, which also has potential of aiding in specimen identification because of its higher discriminatory power. These alternative approaches may provide a baseline for safer identifications and more robust databases that will induce fewer type I or type II errors. It seems clear, at least, that for some groups of odonates, a "2%"-rule (an upper limit of 2% genetic divergence for intraspecific comparisons), as suggested for several other animal groups, will generate inaccurate identifications of these important faunal components and biomonitoring tools.

Chapter 5. Advantages and limitations for DNA barcoding in ecological studies of dragonflies (Insecta: Odonata)

Abstract

DNA barcoding is a molecular identification system that has aided in the recognition of specimens from a wide swath of global biodiversity. Initial discussions, mainly spearheaded by taxonomic experts, regarding the validity and efficiency of the methodology have in many ways now been replaced by conversations on how the methodology can be useful in biodiversity-related fields such as ecology, evolution, and taxonomy. In dragonflies, DNA barcoding has provided detailed information used in ecological and taxonomic studies and has even assisted in arduous matters such as characterization of diets and biogeographic analyses. In this essay, I present an overview of current and potential uses of DNA barcoding in studies of dragonflies, including the fields of ecology, biogeography, ecological interactions, macroevolution, ecophylogenetics, population ecology and biomonitoring. The comparatively high representation of dragonfly species in public databases provides a good opportunity for ecologists to address new and inspiring questions that go beyond the traditional limitations of specimen identification. In this sense, we are just at the beginning of exploring the broad applications of DNA barcoding and its related technologies in ecological matters.

Introduction

One of the central difficulties in ecological studies is specimen identification (Bortolus 2008). Often considered corollary to the main question, correct identifications of organisms are obviously vital steps toward investigating further aspects of the biology, and the structure and function of natural systems (Cotterill 1995). Misidentifications due to phenotypic plasticity or the use of identification keys that demand high degrees of expertise are examples of how traditional methods may be

insufficient in specimen identifications , especially for non-experts. In this regard, it is important to bear in mind the limitations of morphological taxonomy (see Padial et al. 2010) and that, in modern taxonomy, identification and classification are two different processes (Casiraghi et al. 2010). The DNA barcoding method, which uses a fragment of a standardized genetic marker for identifying specimens, represents an alternative tool for objective identification (Valentini et al. 2009); in the case of animals, the cytochrome *c* oxidase subunit I gene (COI) has emerged as the most capable candidate locus (Hebert et al. 2003a).

The use of DNA barcoding methods for identification of aquatic macroinvertebrates began with the advent of DNA barcoding (Hebert et al. 2003a). In that study, several sequences of mayflies and caddisflies were analyzed. Since then, this methodology has been used to help in taxonomic and systematic matters such as inventories of aquatic invertebrate fauna (Evans & Paulay 2012). Among the taxa that have benefitted from this technique, dragonflies (Insecta: Odonata) seem to be conducive to identification via COI comparison and the tool has also been used in studies focused on association of life stages and has contributed to the first steps of evolutionary analyses (e.g. Yu 2016, Koroiva et al. 2017b). As top predators, odonates have an important role in the aquatic food chain and their bipartite life cycle (aquatic nymph and terrestrial adult) makes the group an effective bioindicator of environmental quality, considering the different responses to environmental conditions at each life stage (Valente-Neto et al. 2016, Miguel et al. 2017). Odonates have also served as model organisms for several lines of research, thus providing important information about animal behavior, sexual selection, and life history evolution (Cordoba-Aguilar 2009). Here, the use of DNA barcoding in advancing ecological of dragonflies is discussed and some avenues for future research are presented.

Species distribution

As highlighted in several previous studies (e.g. Hebert et al. 2003a, Raupach et al. 2015), there two main goals of DNA barcoding: (i) to assign unknown specimens to already described and classified species and (ii) facilitate identification of cryptic species. These intrinsic capabilities make this methodology a powerful tool for mapping species distributions, which has proved important in biogeographical studies (Baselga et al. 2013), especially in issues like species geographical distribution expansion and registration of endangered species. Although considered merely descriptive, species records are of great scientific relevance because they indirectly reveal new aspects of the ecological niche and improve knowledge of biological and ecological traits.

The use of DNA barcoding in dragonflies has been evaluated as a useful tool in the identification of cryptic species in new sites since in most dragonfly species, morphological characteristics are insufficient for adequate identification (e.g. Koroiva et al 2017a). In an example of this application, Sánchez-Guillen and Cordero-Rivera (2015) confirmed the presence of *Ischnura senegalensis* (Rambur, 1842) (Insecta: Zygoptera) on the Canary Islands using a DNA barcoding approach. There had been much debate as to whether a single or multiple species of *Ischnura* were present on the islands and the presence of two species was confirmed after molecular fingerprinting.

Along these lines, studies regarding rare or endangered species have also been greatly aided by DNA barcoding. Reliable monitoring of threatened organisms is crucial for data-driven conservation action. Thomsen et al. (2012), using two molecular markers (COI and cytochrome B) for environmental DNA (eDNA) samples (see additional information in next section) were able to record the presence of the large white-faced darter (*Leucorrhinia pectoralis*) (Insecta: Zygoptera). Keeping in mind that

more than 300 species of dragonflies are represented on the International Union for Conservation of Nature Red List (accessed in July 2017), this kind of study is an example of the applicability of DNA barcoding and a way in which it can be used in conservation efforts of dragonflies, especially with non-invasive methods for obtaining genetic material.

Analyses of ecological interactions

General studies of food chain and ecological interspecific relationships, including parasitism and predation, have benefitted greatly from barcode data, considering that the network of trophic interactions can be obtained with more data, speed, and accuracy after using this method. The molecular markers in studies of ecological networks has mainly helped in the identification of network nodes (species) and their network links (interactions), whose resolution can directly affect network topology (Gauzens et al. 2013). In odonates, studies on ecological interactions of organisms that use DNA barcoding have mainly focused on (i) the presence of parasites and (ii) the composition of food chains. von Ellenrieder et al (2015) analyzed specimens of *Hetaerina caja dominula* Hagen in Selys (Insecta: Zygoptera) that were found to be parasitized by a tachinid fly larva. Cheng & Lin (2016), after evaluating the larval feces of the *Euphaea formosa* Hagen 1869 and *Matrona cyanoptera* Hamalainen in the forest stream of central Taiwan, have established a list of prey taxa based on identifications facilitated by COI sequences. In that article, the authors also have estimated the levels of dietary niche overlap of these damselflies and inferred that ecological niches of *E. formosa* and *M. cyanoptera* could be separated by dietary dimensions.

Recently, Siepielski & Beaulieu (2017), after testing the hypothesis that adaptive evolution by a novel predator facilitates range size shifts, concluded that fish predation

contributed to the evolutionary dynamics of *Enallagma* range distributions. Saito et al (2016), after evaluating dragonflies communities in Brazil, indicated that niche conservatism is the main influence on its phylogenetic structure due to clade-specific ecophysiological requirements and because closely related species may also have competitive advantages and dominate certain preferred habitats.

Intraspecific variation and cryptic species

In fact, the use of the COI region was primarily designed for specimen identification. However, this technique has also been successfully used in populational analyses. Mitochondrial DNA sequences have been considered useful for this type of analysis because of their high evolutionary rates with limited recombination and predominantly maternal origin (Mandal et al. 2014, Desalle et al. 2017). These markers are suitable and commonly chosen for estimates of population genetic structure and gene flow among populations. In particular, the mitochondrial COI locus has been frequently used in population genetic studies considering its relatively high mutation rate (even in comparison with other mitochondrial genes) and the large amount of data available for comparisons.

For example, Troast et al. (2016), using the COI gene suggested that high rates of gene flow occur between odonate taxa in all of their included geographic regions, which provided evidence that *Pantala flavescens* should be considered a global panmictic population. However, more recently, Pfeiler & Markow (2017) showed that the presence of geographical structure in this species can be identified through a DNA barcoding approach. Herzog & Hadrys (2017) performed long-term monitoring of odonate taxa to build a dataset that helped identify, evaluate responses to environmental change. In this study, the population of the riverine dragonfly, *Orthetrum coerulescens*

(Odonata: Libellulidae), was monitored between 1989 and 2013. Using both COI and other markers, the authors were able to assess overall low genetic diversity and a population decline between the years 2004 and 2007.

Another ecological application of intraspecific variation analysis is the investigation of cryptic diversity, which is defined as a complex of species in which members are reproductively isolated from each other yet morphologically indistinguishable (Kress et al. 2015). The utility of DNA barcoding and molecular species delineation approaches for cryptic species has been demonstrated by numerous studies (see Kress et al. 2015). As evidenced by Jörger & Schrödl (2013), the discovery of cryptic species is fundamental to the understanding of evolutionary processes, historical biogeography, ecology, and also to conservation approaches (Bickford et al. 2007, Trontelj & Fišer 2009). Although several studies suggest the presence of cryptic species based only on high intraspecific variation and/or the presence of isolated clusters, it is of fundamental importance that possible evolutionary and ecological processes are also queried and inferred.

Damm et al. (2010), using a taxonomic circle methodology (DeSalle et al. 2005), which is a framework that requires corroboration from more than one line of evidence for assessing species discovery (Cordero-Rivera & Lorenzo-Carballa 2010), identified three new species of the *Enallagma*. Further, analyses of ecological patterns revealed differences in habitat preferences among the three genetic clades. On the other hand, Sánchez Herrera et al. (2010), after evaluating populations of *Polythore procera* in Colombia, ascertained a high intraspecific divergence in their populations. However, after the authors evaluated details of the morphology and ecological factors such as female oviposition behaviors, low dispersion, larval ecology, and/or habitat

composition, they were not able to ascertain the lineages as two independent entities, especially in identifying reproductive isolation barriers.

Assessment and monitoring of aquatic habitats

Many authors (e.g. Casas et al. 2017, Koroiva et al. 2017b) consider environmental biomonitoring as the main areas of application for which DNA barcoding can be of great assistance in understanding odonate species distributions. For freshwater insects, traditional monitoring essentially consists of collecting individual organisms, taxonomic identification, and then estimating environmental conditions after considering reference data. However, this kind of biomonitoring faces recurrent criticism, mainly related to dubious taxonomic identifications based on questionable morphological characters, as well as tedious process of data gathering and analysis, which restricts the number of sites that can be monitored and the frequency of controls (Gibson et al. 2015). DNA barcoding has allowed for an increase in taxonomic inclusion, especially for the identification of organisms in juvenile stages. The number of taxa detected increased by 70% when employing DNA barcoding, as compared to a strict morphological approach (Sweeney et al. 2011), and this increase in the number of taxa improved the sensitivity of taxonomic richness-based bioassessment metrics used to discern differences between sites. Furthermore, the incorporation of DNA barcoding into biomonitoring programs are also considered promising for the standardization of evaluation systems applied in different regions and countries (Pilgrim et al. 2011). As evidenced by Hawkins (2006), the lack of standardization is one of the reasons for incompatibility between evaluations – this may be ammended by the use of molecular identification methods.

Dragonflies have an effective capacity to be ecological indicators (Miguel et al. 2017) and act as an umbrella group for freshwater biodiversity conservation (Bried et al. 2007). Although adults are relatively easy to identify, larval stages present difficulties, which invariably limits the specimen identification at lower levels (genus or family) and causes the loss of more refined environmental information (Valente-Neto et al. 2016). After comparing the efficiency of traditional and molecular methods in odonates, Stein et al. (2014a) evaluated bioassessment metrics calculated with data derived from California streams using these two methods and found an increased taxonomic resolution; these findings suggest that identifications based on DNA barcoding have the potential to improve the power to detect stream conditions. Despite this potential, it is necessary to recognize that the full integration of barcoding data in routine bioassessments is challenging. The need for robust databases, effective primers, and the standardization of procedures are some factors that influence the ability to use this technology (additional information is given in the next section).

Finally, analysis of exotic species is another line of research that can benefit from the use of DNA barcoding in dragonflies. The introduction and spread of non-native species is considered a global problem mainly due to invasive species increasingly altering terrestrial and aquatic communities worldwide (Gurevitch & Padilla 2004). It has also been shown that native species decline as a result of exotic species introductions (Mooney & Cleland 2001). Although invasive species registration has been widely evaluated in other animals, there is little or no evidence that introduced dragonfly species have made an impact on native odonate distributions (see Englund 1999, Laister et al. 2014). Recently, Liebhold et al. (2016), after evaluating cases of biological invasions in insects, showed that cases involving aquatic insects are rare, and that this is probably due to lack of pathways for dispersal. Regardless, studies related to

invasive species have been carried out mainly in Europe, most of which are related to specimens collected in greenhouses (Laister et al. 2014). Thus, DNA barcoding can be a useful tool both in the identification of species inadvertently imported due to international trade and in investigations of exotic species introduced into the environment.

Odonate DNA barcoding in the NGS era

Despite the fact that Sanger sequencing provides a robust framework for building large sequence libraries such as DNA barcode reference libraries, this system is limited by the ratio between data gathering and time. In other words, Sanger sequencing is time-consuming and normally results in datasets with lower discriminatory power than larger sequencing efforts. Next-generation sequencing (NGS) can generate millions of DNA sequences concurrently and is able to achieve extensive simultaneous sequencing of a multitude or organisms. Several methods have been developed for wide application of NGS data, such as whole-genome sequencing, genotyping, and phylogenomics. One such method, amplicon sequencing, involves tagging a unique barcode onto PCR-amplicons, which are then pooled for sequencing, resulting in a a vast amount of data for most, if not all, organisms present in the sample (McCormack et al. 2013). This method, when used for organism identification, has also been called "metabarcoding". For arthropods, the COI gene is often used in NGS applications due to many advantages when comparing to nuclear genes, including capabilities of being amplified across a wide range of taxa, possessing faster substitution rates, and existence of an extensive taxonomic reference database, termed the BOLD system (Yu et al. 2012, but see Deagle et al. 2014).

Metabarcoding of aquatic macroinvertebrates has been considered a cost-efficient and reliable community assessment method and also an efficient method for monitoring and managing biodiversity, especially when using so-called eDNA, which is genetic material that can be extracted from bulk environmental samples (Barnes & Turner 2016; see the advantages in Aylagas et al. 2016). Despite this innovation, these studies have rarely evaluated the dragonfly community with the exception of Gibson et al. (2015) in which NGS provided data about an increase in the resolution of alpha, beta, and gamma biodiversity metrics. Considering the multiple function of this taxon as an indicator for monitoring habitats such as a proxy for environmental conditions (Bried & Samways 2015), the use of HTS technology in dragonflies is still in the initial stages even in countries with this technology and established databases. As an example, Curry et al. (2012), after comparing patterns of taxonomic richness and assemblage variation in an important biomonitoring group (Trichoptera) with a group with high conservation significance (Odonata), concluded that the results could be different if there was a more refined scale and if metabarcoding was used. It is worth emphasizing that other fields of odontological studies such as dietary analyses, in which the Sanger methodology is currently used, has also benefitted from the use of these types of sequencing platforms (see Pompanon et al. 2012, Bybee et al. 2016).

Challenges to odonate DNA barcoding in ecological studies

Since the inception of the COI gene region as a universal DNA barcode, the use of an integrative molecular and morphological approach to taxonomy has been the subject of much debate by several investigators (Will & Rubinoff 2004, Will et al. 2005, Cameron et al. 2006). One of the main justifications against the use of DNA-based identification methods are the large gaps present in molecular databases for most taxa

(Cameron et al. 2006). The current database for odonates houses more than 6,000 cataloged species (Dijkstra et al. 2013) (estimating about 7,000 species in the world; Kalkman et al. 2008) and about 2,500 species from 62 countries with sequences deposited in the BOLD System (June 2017) show a peculiar situation for the Odonata order. The large representation of species data in public databases provides an excellent opportunity for ecologists to address new and inspiring questions that go beyond the traditional approaches for specimen identification.

Despite this enthusiastic consideration, it is important to recognize that the methodology has some limitations. Even with volumes of sequencing data that has been accumulating at an increasing rate, many taxa and regions are still undersampled in the Odonata database. While Europe is already nearing the goal of sequencing all species on the continent, regions of higher species diversity such as Thailand (Casas et al. 2017), India (Laltanpuii et al. 2017), Brazil (Koroiva et al. 2017a), and the African continent (Dijkstra et al. 2015) are still in the infancy of constructing such large databases. In addition, Koroiva & Kvist (2017), after evaluating a global dataset of odonate taxa in a DNA barcoding framework, identified that many dragonfly species showed an overlap between intraspecific and interspecific molecular distances – the region termed the barcoding gap. The lack of a barcoding gap has negative effects on efforts to identify specimens based on DNA barcoding, insofar as some species may not be correctly identified if a gap is lacking (e.g. van Nieukerken et al. 2012).

The utility of DNA barcoding in the most diverse areas of dragonfly biology should be emphasized. As previously described, many lines of research are still in their infancy regarding the use of DNA barcoding methodology. With the progressive reduction of NGS costs and the rapid development of methods for biomonitoring issues of dragonflies (see Elbrecht et al. 2016, 2017), the next steps for using DNA

metabarcoding will require mainly robust local DNA barcode libraries and more ecological studies.

Local databases are necessary because, in general, local data have better identification capacity in biomonitoring studies and are more effective in discriminating species (Parmentier et al. 2013, Koroiva & Kvist 2017). For ecological studies, such as analyses of indicator species, data for locally distributed taxa will allow the effective incorporation of this technology into environmental monitoring programs and can provide a better understanding of minimally explored ecological task such as food chain and biogeography. Obviously, the method also requires skilled labor, especially from bioinformatics professionals, considering the new sequencing instruments and the large volume of data to be analyzed (Orozco et al. 2013).

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Chapter 6. Conclusion, comments and perspectives

In this thesis, I have developed a broad analysis about the use and possible applications of molecular markers, especially DNA barcoding in Neotropical dragonflies. Despite the existence of a robust global database, molecular information on species present in South America is still scarce. Information generated in this thesis increases the number of species with deposited sequences present in South America by almost 50%, which demonstrates the great challenge that odonatologists still face to in obtaining complete molecular information of species for the region, such as it will happen in Europe in the next several years. In this sense, in my brief review about the application of COI DNA barcoding in studies of dragonflies, I show that except for a few papers about ecophylogenetic analyzes, use of this method in ecological studies in South America is practically nonexistent. Beyond the molecular question, I also show that even basic information such as "how many species there are in one of the most threatened regions in Brazil" are still incomplete. Thus, the results of this thesis only reinforce the problem raised by Hortal et al. (2015): taxonomic information restricts the development capacity of any other field of biodiversity studies.

The use of the DNA barcode for specimen identification of Neotropical odonates was considered efficient. Through this molecular marker, we obtained a reliable identification for more than 90% of the specimens collected in one of the most diverse regions in Brazil. Moreover, through the evaluation of the barcode gap in a global dataset, it was possible to verify that little more than 15% of the odonatan species of the world cannot be separated using this technique. Given the lack of taxonomists and the great diversity of species for the region, I show that the use of this technique is a viable solution (in a technical and financial sense) to overcome these limitations. As explored

in the discussion sections, the results of these chapters have direct implications in biodiversity fields such as taxonomy (e.g. limitation to use the COI gene for specimen identification on a global scale), evolution (e.g. low intraspecific variation value in Argia species), and biomonitoring (e.g. ability to identify specimens with the COI gene) of Neotropical species. Obviously, enhancement of local databases is necessary, but the evidence for usability of the DNA barcode method is of fundamental importance for future scientific studies. Financial efforts ought be developed and implemented accordingly.

In this context, the development of studies and databases of DNA barcode for Neotropical dragonflies should be considered as a promising tool of wide and immediate application for this taxon and the first steps taken by this work should contribute to a new look at genetic studies.

Chapter 7. Publications

List of published or in-press articles and book developed during my PhD period.

Articles

- KOROIVA, R., KVIST, S. (2017) Estimating the barcoding gap in a global dataset of cox1 sequences for Odonata: close, but no cigar. Mitochondrial DNA – Part A. http://dx.doi.org/10.1080/24701394.2017.1357709
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- KITAURA, M. J.; GUMBOSK, E.; KOROIVA, R. 'Five new records and an identification key of the lichen genus *Leptogium* from Santa Catarina state, Brazil. Rordiguésia. Accepted in 2017.
- NEVES, M. O. ; SILVA, L. A.; AKIEDA, P. S.; CABRERA, R.; KOROIVA, R. ; SANTANA, D. A new species of poison frog, genus *Ameerega* Bauer, 1986 (Anura: Dendrobatidae), from Southern Amazonian Rain Forest. Salamandra. Accepted in 2017.
- NUNES, A. V.; KOROIVA, R.; GOMES, V. G. N.; ORSINI, V. S. (2017) Distribution extension of *Ateles chamek* (Humboldt 1812) in the southwestern

Brazilian Amazon: identification by visual evidence and fecal DNA. Mammalia , https://doi.org/10.1515/mammalia-2016-0180

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- RODRIGUES, M. E.; KOROIVA, R.; RAGALZI-DA-SILVA, E.; MOURA, E. B. (2016a) *Mecistogaster linearis* (Fabricius) (Odonata: Coenagrionidae): First Record from Mato Grosso do Sul State, Brazil. EntomoBrasilis (Vassouras), v. 9, p. 212-215.
- GOMES, V. G. N.; KOROIVA, R.; ARAUJO, A. C. (2016) Vertebrate florivory on the short-columnar cactus *Echinopsis rhodotricha* K. Schum. in the Brazilian Chaco. Plant Ecology (Dordrecht),v. 217, p. 1481-1487.
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- LEONEL, B. F.; KOROIVA, R.; HAMADA, N.; FERREIRA-KEPPLER, R. L.; ROQUE, F. O (2015). Potential effects of climate change on ecological interaction outcomes between two disease-vector mosquitoes: A mesocosm experimental study. Journal of Medical Entomology, v. 52, p. 866-872.

Book

- KOROIVA, R.; GOMES, V. G. N.; SOUZA, C. S.; SCUR, M. C.; ARAUJO, A. C.; RIBEIRO, D. B.; FISCHER, E.; LAPS, R. Ecologia do Pantanal: curso de campo, 2014. 1. ed. Campo Grande: Ed. UFMS, 2017. v. 1. 317p .

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Supplementary files

Chapter 1

S1 Table. Zygoptera species from seven South American countries with information about distribution, deposited sequences and sequenced genes (CO, Colombia; PE, Peru; EC, Ecuador; GU, French Guyana; BR, Brazil; UR, Uruguay and AR, Argentina).

S2 Table. Anisoptera species from seven South American countries with information about distribution, deposited sequences and sequenced genes (CO, Colombia; PE, Peru; EC, Ecuador; GU, French Guyana; BR, Brazil; UR, Uruguay and AR, Argentina).

S1 Table. Zygoptera species from seven South American countries with information about distribution, deposited sequences and sequenced genes (CO, Colombia; PE, Peru; EC, Ecuador; GU, French Guyana; BR, Brazil; UR, Uruguay and AR, Argentina).

Taxa			Species presence in each country (X, presence; 0, absence)							Species presence with deposited sequences per gene (X, presence; 0, absence)														
Family/ genus	species		CO	PE	EC	GU	BR	UR	AR	COI	COII	12S	16S	18S	28S	Histone H3	ND1	tRNA-Leu	EF-1A	ITS1	ITS 2	5.8S	Cyt b	PRMT	tRNA-Val
Perilestidae																									
Perilestes	P. attenuatus		0	X	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perilestes	P. fragilis		0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perilestes	P. gracillimus		0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perilestes	P. kahli		X	X	X	0	X	0	0	X	0	0	X	X	X	X	0	0	0	0	0	0	0	0	0
Perilestes	P. minor		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perilestes	P. solutus		0	0	0	0	X	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Perissolestes	P. aculeatus		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perissolestes	P. castor		0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perissolestes	P. cornutus		0	X	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perissolestes	P. flinti		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perissolestes	P. quianensis		0	0	0	X	0	0	0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Perissolestes	P. klugi		0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perissolestes	P. magdalenae		X	0	X	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0
Perissolestes	P. paprzyckii		0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perissolestes	P. remotus		0	X	X	0	0	0	0	0	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0
Perissolestes	P. remus		0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perissolestes	P. romulus		0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Total number in the family	2	10	8	2	10	0	0	1	1	1	3	3	3	1	0	0	0	0	0	0	0	0	0
Lestidae																									
Archilestes	A. exoletus		0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Archilestes	A. grandis		X	0	0	0	0	0	0	0	X	X	X	X	X	X	X	0	0	0	0	0	0	0	0
Lestes	L. apollinaris		X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lestes	L. auritus		0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lestes	L. bipupillatus		0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lestes	L. debellardi		0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lestes	L. dichrostigma		0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lestes	L. falcifer		0	X	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lestes	L. fernandoi		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lestes	L. forficula		X	X	X	X	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lestes	L. henshawi		X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lestes	L. helix		0	X	0	0	X	0	0	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Lestes	L. jerrelli		0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lestes	L. jurzitzai		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lestes	L. minutus		0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lestes	L. paulistus		0	0	0	0	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lestes	L. pictus		0	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lestes	L. quadristriatus		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lestes	L. spatula		0	0	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lestes	L. sternalis		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lestes	L. tenuatus		X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lestes	L. tricolor		0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lestes	L. undulatus		0	0	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lestes	L. urubamba		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Total number in the family	6	8	4	4	14	3	10	1	1	1	2	1	2	1	1	0	0	0	0	0	0	0	0
Platystictidae																									
Palaemnema	P. abbreviata		0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palaemnema	P. apicalis		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palaemnema	P. azupizui		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palaemnema	P. brasiliensis		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palaemnema	P. brevignoni		0	0	0	X	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palaemnema	P. brucei		X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palaemnema	P. carmelita		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palaemnema	P. clementia		X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palaemnema	P. croceicauda		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palaemnema	P. dentata		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palaemnema	P. edmondi		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palaemnema	P. joanetta		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palaemnema	P. lorena		0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palaemnema	P. martini		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palaemnema	P. melanocauda		0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palaemnema	P. mutans		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palaemnema	P. nathalia		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palaemnema	P. peruviana		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Palaemnema	P. picicaudata		0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Total number in the family	10	4	6	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Calopteryqidae																									
Bryoplathanon	B. globifer		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. amazonica		0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. auripennis		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. aurora		X	X	X	0	0	0	0	X	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. brightwelli		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. caja		X	X	X	X	0	0	0	X	0	X	0	0	X	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. capitalis		X	X	X	0	0	0	0	X	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. charca		0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. cruentata		X	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. curvicauda		0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. duplex		X	0	X	0	0	0	0	X	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. flavipennis		0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. fuscoguttata		X	0	X	0	0	0	0	X	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. gallardi		0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. hebe		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Taxa			Species presence in each country (X, presence; 0, absence)							Species presence with deposited sequences per gene (X, presence; 0, absence)															
Family/genus	species		CO	PE	EC	GU	BR	UR	AR	**COI**	**COII**	**12S**	**16S**	**18S**	**28S**	**Histone H3**	**ND1**	**tRNA-Leu**	**EF-1A**	**ITS1**	**ITS 2**	**5.8S**	**Cyt b**	**PRMT**	**tRNA-Val**
Hetaerina	H. indeprensa		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. laesa		X	X	0	X	X	0	0	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. longipes		0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. medinai		0	0	0	0	X	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. mendezi		0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. miniata		X	0	X	0	0	0	0	X	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. moribunda		0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. mortua		0	X	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. occisa		X	X	X	0	0	0	0	X	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. proxima		X	0	0	0	X	0	X	X	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. rosea		0	X	0	0	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. sanguinea		X	X	X	X	X	0	X	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. sempronia		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. simplex		X	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. vulnerata		X	0	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Hetaerina	H. westfalli		0	0	0	0	X	0	0	X	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Mnesarete	M. aenea		0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mnesarete	M. astrape		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mnesarete	M. borchgravii		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mnesarete	M. cupraea		0	X	0	X	X	0	0	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Mnesarete	M. devillei		0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mnesarete	M. drepane		0	X	X	0	0	0	0	X	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Mnesarete	M. ephippium		0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mnesareta	M. fulgida		X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mnesarete	M. fuscibasis		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mnesarete	M. grisea		0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mnesarete	M. guttifera		0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mnesarete	M. hauxwelli		0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mnesarete	M. hyalina		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mnesarete	M. lencionii		0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mnesarete	M. loutoni		0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mnesarete	M. machadoi		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mnesarete	M. marginata		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mnesarete	M. mariana		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mnesarete	M. metallica		X	0	X	0	0	0	0	X	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Mnesarete	M. pruinosa		0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mnesarete	M. pudica		0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mnesarete	M. rhopalon		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mnesarete	M. smaragdina		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mnesarete	M. williamsoni		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ormenophlebia	O. imperatrix		X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ormenophlebia	O. regina		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ormenophlebia	O. saltuum		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Total number in the family	37	30	29	9	36	1	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dicteriadidae																									
Dicterias	D. atrosanguinea		0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heliocharis	H. amazona		X	X	X	X	X	0	X	X	0	X	X	X	X	0	0	0	0	0	0	0	0	0	0
		Total number in the family	1	1	1	1	1	1	1	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Megapodagrionidae																									
Heteragrion	H. aequatoriale		X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. angustipenne		0	X	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. aurantiacum		0	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. bariai		0	X	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. beschkii		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. bickorum		0	0	X	0	0	0	0	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. breweri		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. calendulum		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. consors		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. cooki		0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. dorsale		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. erythrogastrum		X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. flavidorsum		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. flavovittatum		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. gracile		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. ictericum		0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. icterops		0	X	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. inca		0	X	X	0	X	0	0	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. luisfelipei		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. mantiqueirae		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. melanurum		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. mitratum		X	0	0	0	0	0	0	0	0	0	0	X	X	0	0	0	0	X	X	X	0	0	0
Heteragrion	H. muryense		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. obsoletum		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. ochraceum		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. ovatum		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. peregrinum		X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. petiense		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. silvarum		0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. simulatum		0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. tiradentense		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteragrion	H. triangulare		0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxystigma	O. cyanofrons		0	0	0	X	X	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0
Oxystigma	O. petiolatum		0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Allopodagrion	A. brachyurum		0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Allopodagrion	A. contortum		0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Allopodagrion	A. erinys		0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Taxa			Species presence in each country (X, presence; 0, absence)							Species presence with deposited sequences per gene (X, presence; 0, absence)															
Family/genus	species		CO	PE	EC	GU	BR	UR	AR	**COI**	**COII**	**12S**	**16S**	**18S**	**28S**	**Histone H3**	**ND1**	**tRNA-Leu**	**EF-1A**	**ITS1**	**ITS 2**	**5.8S**	**Cyt b**	**PRMT**	**tRNA-Val**
Megapodagrion	M. megalopus		0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Teinopodagrion	T. angulatum		0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Teinopodagrion	T. caquetanum		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Teinopodagrion	T. chinichaysuyum		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Teinopodagrion	T. curtum		X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Teinopodagrion	T. decipiens		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Teinopodagrion	T. depressum		0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Teinopodagrion	T. epidrium		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Teinopodagrion	T. eretes		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Teinopodagrion	T. macropus		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Teinopodagrion	T. mercenarium		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Teinopodagrion	T. meridionale		0	0	0	0	0	0	X	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Teinopodagrion	T. muzanum		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Teinopodagrion	T. nebulosum		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Teinopodagrion	T. oscillans		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Teinopodagrion	T. setigerum		0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Teinopodagrion	T. temporale		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Teinopodagrion	T. vallenatum		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Teinopodagrion	T. venale		X	0	0	0	0	0	0	X	X	X	X	X	X	X	0	0	0	X	X	X	0	0	0
Teinopodagrion	T. waynu		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dimeragrion	D. percubitale		0	0	0	X	X	0	0	X	0	0	X	X	X	0	0	0	0	0	0	0	0	0	0
Heteropodagrion	H. croizati		0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heteropodagrion	H. sanguinipes		0	0	X	0	0	0	0	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Heteropodagrion	H. superbum		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mesagrion	M. leucorhinum		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Archaeopodagrion	A. armatum		0	0	X	0	0	0	0	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Archaeopodagrion	A. bicorne		0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Archaeopodagrion	A. bilobatum		0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philogenia	P. berenice		0	X	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0
Philogenia	P. boliviana		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philogenia	P. cassandra		X	X	X	0	0	0	0	X	X	X	X	X	X	X	0	0	0	0	0	0	0	0	0
Philogenia	P. compressa		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philogenia	P. cristalina		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philogenia	P. ebona		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philogenia	P. elisabeta		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philogenia	P. helena		X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philogenia	P. iquita		0	X	0	0	0	0	0	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Philogenia	P. macuma		0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philogenia	P. mangosisa		0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philogenia	P. margarita		0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philogenia	P. minteri		0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philogenia	P. monotis		0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philogenia	P. peruviana		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philogenia	P. raphaella		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philogenia	P. reduncа		0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philogenia	P. schmidti		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philogenia	P. silvarum		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philogenia	P. sucra		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philogenia	P. tinalandia		0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Philogenia	P. umbrosa		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Total number in the family	24	26	26	6	28	0	6	9	2	2	9	6	10	2	0	0	0	2	2	2	0	0	0
Polythoridae																									
Chalcopteryx	C. machadoi		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chalcopteryx	C. radians		0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chalcopteryx	C. rutilans		0	X	0	0	X	0	X	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Chalcopteryx	C. scintillans		0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chalcopteryx	C. seabrai		0	0	0	X	X	0	0	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Cora	C. aurea		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cora	C. chiribiquete		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cora	C. confusa		X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cora	C. dorada		0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cora	C. dualis		0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cora	C. inca		X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cora	C. irene		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cora	C. jocosa		0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cora	C. klenei		X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cora	C. lugubris		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cora	C. marina		X	0	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Cora	C. modesta		X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cora	C. munda		0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cora	C. parda		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cora	C. semiopaca		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cora	C. subfumata		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cora	C. terminalis		X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cora	C. xanthostoma		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Euthore	E. fasciata		X	X	X	0	0	0	0	0	X	X	X	X	X	X	0	0	0	0	0	0	0	0	0
Euthore	E. fassli		X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Euthore	E. hyalina		X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Euthore	E. inlactea		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Euthore	E. leroii		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Euthore	E. mirabilis		0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Miocora	M. pellucida		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Miocora	M. peraltica		X	0	X	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0
Polythore	P. aurora		0	X	X	0	X	0	0	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Polythore	P. batesi		0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polythore	P. beata		X	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polythore	P. boliviana		0	X	0	0	0	0	0	0	X	X	X	X	X	X	0	0	0	0	0	0	0	0	0

Taxa			Species presence in each country (X, presence; 0, absence)							Species presence with deposited sequences per gene (X, presence; 0, absence)															
Family/genus	species		CO	PE	EC	GU	BR	UR	AR	**COI**	**COII**	**12S**	**16S**	**18S**	**28S**	**Histone H3**	**ND1**	**tRNA-Leu**	**EF-1A**	**ITS1**	**ITS 2**	**5.8S**	**Cyt b**	**PRMT**	**tRNA-Val**
Polythore	P. concinna		X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polythore	P. derivata		X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polythore	P. gigantea		X	X	X	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polythore	P. lamerceda		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polythore	P. manua		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polythore	P. mutata		X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polythore	P. neopicta		0	X	X	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polythore	P. ornata		0	X	X	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polythore	P. picta		0	X	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polythore	P. procera		X	X	X	0	0	0	0	X	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0
Polythore	P. spaeteri		0	X	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polythore	P. terminata		0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polythore	P. victoria		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polythore	P. vittata		0	X	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Polythore	P. williamsoni		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stenocora	S. percornuta		0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Total number in the family	21	34	23	2	10	0	1	7	2	2	5	4	5	2	0	1	0	0	0	0	0	0	0
Amphipterygidae																									
Rimanella	R. arcana		0	0	0	X	X	0	0	0	0	0	X	X	X	0	0	0	0	0	0	0	0	0	0
		Total number in the family	0	0	0	1	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0
Coenagrionidae																									
Acanthagrion	A. abunae		X	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. adustum		X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. aepiolum		0	X	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. amazonicum		0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. apicale		X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. ascendens		X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. chacoense		0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. chararum		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. cuyabae		0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. egleri		0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. floridense		X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. fluviatile		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. gracile		0	X	X	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. hartei		0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. hildegarda		0	0	0	0	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. indefensum		0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. inexpectum		X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. jessei		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. kennedii		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. lancea		0	X	X	0	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. longispinosum		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. minutum		X	X	0	X	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. obsoletum		X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. peruanum		0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. peruvianum		X	X	X	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. phallicorne		0	X	X	0	X	0	0	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. rubrifrons		0	X	X	X	X	0	0	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. temporale		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. tepuiense		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. trilobatum		X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. truncatum		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. vidua		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. viridescens		X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. williamsoni		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthagrion	A. yungarum		X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthallagma	A. caeruleum		0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthallagma	A. luteum		0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acanthallagma	A. strohmi		X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aceratobasis	A. cornicauda		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aceratobasis	A. macilenta		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aceratobasis	A. mourei		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aceratobasis	A. nathaliae		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aeolagrion	A. axine		0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aeolagrion	A. dorsale		0	X	X	X	X	0	0	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Aeolagrion	A. inca		0	X	X	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amazoneura	A. ephippigera		0	0	X	0	X	0	0	X	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Amazoneura	A. westfalli		0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Angelagrion	A. fredericoi		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Angelagrion	A. nathaliae		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Andinagrion	A. garrisoni		0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Andinagrion	A. peterseni		0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Andinagrion	A. saliceti		0	0	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anisagrion	A. inornatum		0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anomisma	A. abnorme		X	X	X	0	0	0	0	X	0	0	X	0	X	X	0	0	0	0	0	0	0	0	0
Antiagrion	A. grinbergsi		0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argentagrion	A. ambiguum		0	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. adamsi		X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. albistigma		0	0	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. bicellulata		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. botacudo		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. chapadae		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. claussenii		0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. collata		0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. croceipennis		0	0	0	0	X	X	X	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. cupraurea		X	X	0	0	X	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0

Taxa		Species presence in each country (X, presence; 0, absence)							Species presence with deposited sequences per gene (X, presence; 0, absence)															
Family/genus	species	CO	PE	EC	GU	BR	UR	AR	**COI**	**COII**	**12S**	**16S**	**18S**	**28S**	**Histone H3**	**ND1**	**tRNA-Leu**	**EF-1A**	**ITS1**	**ITS 2**	**5.8S**	**Cyt b**	**PRMT**	**tRNA-Val**
Argia	A. cuprea	X	X	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. difficilis	X	X	X	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. dives	X	X	X	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. eliptica	0	0	0	0	X	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. euphorbia	0	X	0	0	X	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. extranea	0	X	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. fissa	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. fraudatricula	0	X	X	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. fumigata	0	0	0	X	X	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. funebris	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. gerhardi	X	X	X	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. hamulata	0	X	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. hasemani	0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. huanacina	0	X	X	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. impura	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. inculta	0	X	X	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. indicatrix	X	X	X	0	X	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. infrequentula	X	0	X	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. infumata	0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. insipida	0	0	0	X	X	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. jocosa	X	0	X	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. joergenseni	0	0	0	0	0	0	X	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. jujuya	0	0	0	0	0	0	X	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. kokama	X	X	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. lilacina	0	0	0	0	X	0	X	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. limitata	0	X	X	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. mariensis	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. medullaris	X	0	X	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. mishuyaca	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. modesta	0	0	0	0	X	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. mollis	0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. nigrior	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. oculata	X	X	X	X	X	0	0	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Argia	A. orichalcea	X	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. pulla	X	X	X	0	X	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. popoluca	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. reclusa	0	0	0	0	X	0	X	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. serva	0	0	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. smithiana	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. sordida	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. subapicalis	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. talamanca	X	0	X	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. tamoyo	0	0	0	0	X	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. thespis	0	X	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. tinctipennis	0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. translata	X	X	X	X	0	0	X	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. tupi	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. variabilis	X	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. variata	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. variegata	X	X	X	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0
Argia	A. yungensis	0	X	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromeliagrion	B. beebeanum	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bromeliagrion	B. rehni	0	0	X	0	X	0	0	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Calvertagrion	C. minutissimum	0	X	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyanallagma	C. bonariense	0	0	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyanallagma	C. ferenigrum	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyanallagma	C. interruptum	0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyanallagma	C. nigrinuchale	0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyanallagma	C. trimaculatum	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Denticulobasis	D. ariken	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Denticulobasis	D. dunkllei	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Denticulobasis	D. garrisoni	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dolonagrion	D. fulvellum	0	X	0	0	0	0	0	X	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Drepanoneura	D. donnellyi	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drepanoneura	D. flinti	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drepanoneura	D. janirae	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drepanoneura	D. loutoni	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drepanoneura	D. muzoni	0	X	X	0	0	0	0	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Drepanoneura	D. peruviensis	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Drepanoneura	D. tennesseni	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Enallagma	E. civile	X	0	0	0	0	0	0	X	X	X	0	0	0	0	0	X	0	0	0	0	X	0	0
Enallagma	E. coecum	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Enallagma	E. novaehispaniae	X	X	X	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Enallagma	E. praevarum	X	0	0	0	0	0	0	X	X	0	0	0	0	0	0	X	0	0	0	0	0	0	0
Epipleoneura	E. albuquerqei	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epipleoneura	E. angeloi	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epipleoneura	E. capilliformis	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epipleoneura	E. demarmelsi	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epipleoneura	E. fernandezi	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epipleoneura	E. fuscaenea	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epipleoneura	E. haroldoi	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epipleoneura	E. humeralis	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epipleoneura	E. kaxuriana	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epipleoneura	E. lamina	0	0	X	X	0	0	0	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Epipleoneura	E. machadoi	0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epipleoneura	E. manauensis	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epipleoneura	E. metallica	X	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Taxa		Species presence in each country (X, presence; 0, absence)							Species presence with deposited sequences per gene (X, presence; 0, absence)																
Family/genus	species	CO	PE	EC	GU	BR	UR	AR	**COI**	**COII**	**12S**	**16S**	**18S**	**28S**	**Histone H3**	**ND1**	**tRNA-Leu**	**EF-1A**	**ITS1**	**ITS 2**	**5.8S**	**Cyt b**	**PRMT**	**tRNA-Val**
Epipteoneura	E. pallida	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epipteoneura	E. pereirai	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epipteoneura	E. protostictoides	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epipteoneura	E. spatulata	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epipteoneura	E. tariana	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epipteoneura	E. uncinata	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epipteoneura	E. venezuelensis	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epipteoneura	E. waiwaiana	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epipteoneura	E. westfalli	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epipteoneura	E. williamsoni	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epipotoneura	E. machadoi	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epipotoneura	E. nehalennia	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fluminagrion	F. taxaense	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Forcepsioneura	F. ephippigera	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Forcepsioneura	F. garrisoni	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Forcepsioneura	F. grossiorum	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Forcepsioneura	F. haerteli	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Forcepsioneura	F. itatiaiae	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Forcepsioneura	F. lucia	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Forcepsioneura	F. sancta	0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Forcepsioneura	F. williamsoni	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Helveciagrion	H. obsoletum	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Helveciagrion	H. simulacrum	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Homeoura	H. ambigua	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Homeoura	H. chelifera	X	0	0	0	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Homeoura	H. lindneri	0	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Homeoura	H. nepos	0	X	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Homeoura	H. obrieni	X	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Homeoura	H. silviae	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Homeoura	H. sobrina	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Idioneura	I. ancilla	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Idioneura	I. cellioi	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Inpabasis	I. hubelli	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Inpabasis	I. machadoi	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Inpabasis	I. rosea	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ischnura	I. capreolus	X	X	X	X	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ischnura	I. chingaza	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ischnura	I. cruzi	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ischnura	I. cyane	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ischnura	I. denticollis	X	0	0	0	0	0	0	0	X	X	X	X	0	0	0	0	X	0	0	0	X	X	0	0
Ischnura	I. fluviatilis	0	X	X	X	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ischnura	I. hastata	X	0	0	X	0	0	0	0	X	X	0	0	0	0	X	X	0	0	0	0	X	0	0	0
Ischnura	I. indivisa	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ischnura	I. ramburii	X	X	0	0	0	0	0	X	X	X	0	X	0	0	0	X	0	0	0	0	X	0	0	0
Ischnura	I. ultima	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptagrion	L. aculeatum	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptagrion	L. acutum	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptagrion	L. alfonsoi	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptagrion	L. andromache	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptagrion	L. bocainense	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptagrion	L. capixabae	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptagrion	L. dardanoi	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptagrion	L. dispar	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptagrion	L. elongatum	0	0	0	0	X	0	0	0	X	0	0	0	X	0	0	X	0	0	0	0	0	0	0	0
Leptagrion	L. garbei	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptagrion	L. macrurum	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptagrion	L. perlongum	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptagrion	L. porrectum	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptagrion	L. siqueirai	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptagrion	L. vriesianum	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptobasis	L. buchholzi	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptobasis	L. mauffrayi	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptobasis	L. raineyi	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptobasis	L. vacillans	X	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mecistogaster	M. amalia	0	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mecistogaster	M. asticta	0	X	0	0	X	0	0	X	0	X	X	0	X	X	X	X	X	0	0	0	0	0	0	0
Mecistogaster	M. buckleyi	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mecistogaster	M. jocaste	X	X	X	0	X	0	0	0	0	X	X	0	X	X	X	X	X	0	0	0	0	0	0	0
Mecistogaster	M. linearis	X	0	X	X	X	0	0	X	0	X	X	X	X	X	X	X	X	0	0	0	0	0	0	0
Mecistogaster	M. lucretia	0	X	X	X	X	0	X	X	0	X	X	0	X	X	0	0	0	0	0	0	0	0	0	0
Mecistogaster	M. modesta	X	0	X	0	0	0	0	0	0	X	X	X	X	X	0	0	0	0	0	0	0	0	0	0
Mecistogaster	M. ornata	X	X	X	X	X	0	X	0	0	0	0	X	X	X	X	X	X	X	X	X	0	0	0	0
Mecistogaster	M. pronoti	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Megaloprepus	M. caerulatus	X	X	X	0	0	0	0	0	0	X	X	X	X	X	X	X	X	X	0	0	0	0	0	0
Mesamphiagrion	M. demarmelsi	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mesamphiagrion	M. dunklei	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mesamphiagrion	M. ecuatoriale	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mesamphiagrion	M. laterale	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mesamphiagrion	M. occultum	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mesamphiagrion	M. ovigerum	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mesamphiagrion	M. risi	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mesamphiagrion	M. tamaense	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mesoleptobasis	M. acuminata	0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mesoleptobasis	M. cantralli	0	0	0	X	X	0	0	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0
Mesoleptobasis	M. elongata	0	0	0	0	X	0	0	X	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0
Mesoleptobasis	M. incus	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Metaleptobasis	M. amazonica	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Taxa		Species presence in each country (X, presence; 0, absence)							Species presence with deposited sequences per gene (X, presence; 0, absence)																
Family/genus	species	CO	PE	EC	GU	BR	UR	AR	**COI**	**COII**	**12S**	**16S**	**18S**	**28S**	**Histone H3**	**ND1**	**tRNA-Leu**	**EF-1A**	**ITS1**	**ITS 2**	**5.8S**	**Cyt b**	**PRMT**	**tRNA-Val**
Metaleptobasis	M. bicornis	X	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Metaleptobasis	M. brysonima	0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Metaleptobasis	M. diceras	0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Metaleptobasis	M. forelli	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Metaleptobasis	M. gibbosa	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Metaleptobasis	M. knopfi	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Metaleptobasis	M. lillianae	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Metaleptobasis	M. mauffrayi	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Metaleptobasis	M. minteri	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Metaleptobasis	M. orthogonia	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Metaleptobasis	M. paludicola	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Metaleptobasis	M. prostrata	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Metaleptobasis	M. quadricornis	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Metaleptobasis	M. sellysi	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microstigma	M. anomalum	0	X	0	X	X	0	0	0	X	X	X	X	X	X	X	X	0	0	0	0	0	0	0	0
Microstigma	M. maculatum	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microstigma	M. rotundatum	X	X	X	0	X	0	0	0	0	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0
Minagrion	M. caldense	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minagrion	M. canaanense	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minagrion	M. mecistogastrum	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minagrion	M. ribeiroi	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Minagrion	M. waltheri	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nehalennia	N. minuta	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoerythromma	N. cultellatum	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoneura	N. amelia	X	0	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	X	X	0
Neoneura	N. angelensis	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoneura	N. bilinearis	X	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoneura	N. confundens	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoneura	N. denticulata	0	X	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoneura	N. desana	0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoneura	N. esthera	X	0	0	0	0	0	0	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0
Neoneura	N. ethela	0	0	0	0	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoneura	N. fulvicollis	0	0	0	X	X	0	X	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0
Neoneura	N. joana	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoneura	N. jurzitzai	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoneura	N. leonardoi	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoneura	N. lucas	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoneura	N. luzmarina	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoneura	N. mariana	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoneura	N. moorei	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoneura	N. myrthea	X	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoneura	N. rubriventris	0	X	X	0	X	0	0	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0
Neoneura	N. rufithorax	0	X	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoneura	N. schreiberi	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoneura	N. sylvatica	X	0	0	X	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neoneura	N. waltheri	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oreiallagma	O. oreas	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oreiallagma	O. prothoracicum	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oreiallagma	O. quadricolor	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyagrion	O. ablutum	0	0	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyagrion	O. basale	0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyagrion	O. brevistigma	0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyagrion	O. bruchi	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyagrion	O. chapadense	0	0	0	0	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyagrion	O. egleri	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyagrion	O. evanescens	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyagrion	O. fernandoi	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyagrion	O. haematinum	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyagrion	O. hempeli	0	0	0	0	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyagrion	O. hermosae	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyagrion	O. impunctatum	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyagrion	O. machadoi	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyagrion	O. microstigma	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyagrion	O. miniopsis	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyagrion	O. pavidum	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyagrion	O. pseudocardinale	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyagrion	O. rubidum	0	0	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyagrion	O. santosi	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyagrion	O. simile	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyagrion	O. sulinum	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyagrion	O. sulmatogrossense	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyagrion	O. tennesseni	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyagrion	O. terminale	0	0	0	0	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyagrion	O. zielmae	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyallagma	O. dissidens	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peristicta	P. aeneoviridis	0	0	0	0	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peristicta	P. forceps	0	0	0	0	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peristicta	P. gauchae	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peristicta	P. jalmosi	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peristicta	P. janiceae	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peristicta	P. lizeria	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peristicta	P. muzoni	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phasmoneura	P. exigua	0	X	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phasmoneura	P. janirae	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phoenicagrion	P. flammeum	0	X	0	0	X	0	0	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0
Phoenicagrion	P. flavescens	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phoenicagrion	P. ibseni	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Taxa		Species presence in each country (X, presence; 0, absence)							Species presence with deposited sequences per gene (X, presence; 0, absence)														
Family/genus	species	CO	PE	EC	GU	BR	UR	AR	**COI**	**COII**	**12S**	**16S**	**18S**	**28S**	**Histone H3**	**ND1**	**tRNA-Leu**	**EF-1A**	**ITS1**	**ITS 2**	**5.8S**	**Cyt b**	**PRMT**	**tRNA-Val**
Phoenicagrion	P. karaja	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phoenicagrion	P. megalobos	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phoenicagrion	P. paulsoni	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Proneura	P. prolongata	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Protallagma	P. titicacae	0	X	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Protoneura	P. amatoria	X	X	X	0	X	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0
Protoneura	P. calverti	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Protoneura	P. cara	X	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0
Protoneura	P. klugi	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Protoneura	P. macintyrei	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Protoneura	P. paucinervis	0	X	X	0	X	0	0	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Protoneura	P. scintilla	0	X	X	0	X	0	0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Protoneura	P. tenuis	0	X	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Protoneura	P. woytkowskii	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Psaironeura	P. bifurcata	0	X	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Psaironeura	P. remissa	X	0	X	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0
Psaironeura	P. tenuissima	0	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pseudostigma	P. accedens	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Roppaneura	R. beckeri	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Schistolobos	S. boliviensis	0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telagrion	T. longum	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. abuna	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. bickorum	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. brevis	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. carmesina	0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. carminita	0	0	0	X	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. carota	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. carvalhoi	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. celiovallei	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. coccinea	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. corallina	X	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. corbeti	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. demarara	0	X	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. digiticollis	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. divaricata	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. dunklei	0	X	X	0	0	0	0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Telebasis	T. erythrina	0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. farcimentum	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. filiola	X	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. flammeola	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. garleppi	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. garrisoni	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. gigantea	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. griffinii	X	X	X	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. inalata	0	X	X	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. isthmica	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. lenkoi	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. leptocyclia	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. livida	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. milleri	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. myrianae	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. obsoleta	0	X	X	0	X	0	0	X	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Telebasis	T. pallida	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. paraensei	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. pataxo	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. racenisi	0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. rubricauda	0	X	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. salva	X	0	0	0	0	0	0	0	X	X	X	X	X	X	0	X	0	0	0	0	X	0	0
Telebasis	T. simulacrum	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. simulata	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. theodori	0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. versicolor	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. vulcanoae	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. watsoni	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. williamsoni	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Telebasis	T. willinki	0	0	0	0	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tigriagrion	T. aurantinigrum	0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tuberculobasis	T. arara	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tuberculobasis	T. cardinalis	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tuberculobasis	T. costalimai	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tuberculobasis	T. guarani	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tuberculobasis	T. inversa	0	X	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tuberculobasis	T. karitiana	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tuberculobasis	T. macuxi	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tuberculobasis	T. mammillaris	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tuberculobasis	T. tirio	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tuberculobasis	T. yanomami	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tukanobasis	T. corbeti	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total number in the family	93	123	106	54	241	22	61	26	7	13	60	15	27	10	9	11	5	1	1	1	5	2	1
	Total number in Zygoptera	174	228	191	78	341	26	89	61	13	21	84	32	64	16	10	12	5	3	3	3	5	2	1

S2 Table. Anisoptera species from seven South American countries with information about distribution, deposited sequences and sequenced genes (CO, Colombia; PE, Peru; EC, Ecuador; GU, French Guyana; BR, Brazil; UR, Uruguay and AR, Argentina).

Taxa		Species presence in each country (X, presence; 0, absence)							Species presence with deposited sequences per country (X, presence; 0, absence)							Species presence with deposited sequences per gene (X, presence; 0, absence)															
Family/ oenus	species	CO	PE	EC	GU	BR	UR	AR	CO	PE	EC	GU	BR	UR	AR	COI	COII	12S	16S	18S	28S	Histone H3	ND1	tRNA-Leu	EF-1A	ITS1	ITS 2	5.8S	Cyt b	PRMT	tRNA-Val
Petaluridae																															
Phenes	P. raptor	0	0	0	0	0	0	X	0	0	0	0	0	0	X	0	X	X	X	X	X	X	0	0	0	0	0	0	0	0	X
Total number in the family		0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1
Austropetaliidae																															
Phyllopetalia	P. pudu	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total number in the family		0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aeshnidae																															
Allopetalia	A. pustulosa	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anax	A. amazili	X	X	X	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anax	A. concolor	X	0	X	X	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anax	A. eschioioier	0	0	0	X	0	0	0	0	0	0	X	0	0	0	X	0	0	X	X	0	0	X	0	0	0	0	0	0	0	0
Andaeschna	A. rufipes	X	X	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Castoraeschna	C. castor	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Castoraeschna	C. colorata	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Castoraeschna	C. corbeti	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Castoraeschna	C. coronata	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Castoraeschna	C. decurvata	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Castoraeschna	C. ianuaria	0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Castoraeschna	C. lonafieldae	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coryphaeschna	C. adnexa	X	X	X	X	X	0	X	X	X	X	X	X	0	X	0	0	0	X	0	0	0	X	X	0	0	0	0	0	0	0
Coryphaeschna	C. amazonica	0	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coryphaeschna	C. diapyra	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coryphaeschna	C. huaorania	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coryphaeschna	C. perrensi	0	X	X	0	X	X	X	0	X	X	0	X	X	X	0	0	0	X	0	0	0	X	X	0	0	0	0	0	0	0
Coryphaeschna	C. viridias	X	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gynacantha	G. adela	0	X	X	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gynacantha	G. auricularis	0	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gynacantha	G. bartai	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gynacantha	G. bifida	0	X	X	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gynacantha	G. caudata	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gynacantha	G. convergens	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gynacantha	G. francesca	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gynacantha	G. crocoipennis	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gynacantha	G. gracilis	0	X	X	X	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gynacantha	G. interioris	0	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gynacantha	G. jessei	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gynacantha	G. klapesi	0	X	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gynacantha	G. litoralis	0	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gynacantha	G. membranalis	X	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gynacantha	G. mexicana	X	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gynacantha	G. nervosa	X	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gynacantha	G. remartinia	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gynacantha	G. tenuis	X	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gynacantha	G. tibiata	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnetron	L. antarcticum	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Limnetron	L. debile	0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neuraeschna	N. calverti	0	X	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neuraeschna	N. capillata	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neuraeschna	N. claviforcipata	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neuraeschna	N. clavulata	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neuraeschna	N. costalis	0	0	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neuraeschna	N. dentigera	X	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neuraeschna	N. harpya	0	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neuraeschna	N. maxima	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neuraeschna	N. maya	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neuraeschna	N. mavoruna	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neuraeschna	N. mina	0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neuraeschna	N. producta	0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neuraeschna	N. taeniatica	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neuraeschna	N. titania	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Remartinia	R. luteipennis	X	0	X	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Remartinia	R. restricta	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Remartinia	R. rufipennis	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. absoluta	0	X	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. biliosa	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. bonariensis	0	0	0	0	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. brasiliensis	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. brevicercia	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. brevifrons	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. confusa	0	0	0	0	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. cornigera	X	X	X	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. decessus	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. diffinis	0	X	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. eduardoi	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. elsia	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. fissifrons	0	X	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. haaruoi	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. intricata	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. itataia	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. joannisi	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. marchali	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. obscura	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. pallipes	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. pauloi	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. peralta	0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. planaltica	X	X	X	0	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. psilus	0	X	X	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. punctata	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. serrania	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. variegata	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhionaeschna	R. vigintipunctata	0	X	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Staurophlebia	S. auca	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Staurophlebia	S. bosqi	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Staurophlebia	S. giqantula	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Staurophlebia	S. reticulata	X	X	X	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Staurophlebia	S. wayana	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Triacanthagyna	T. caribbea	X	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Triacanthagyna	T. dentata	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Triacanthagyna	T. ditzleri	X	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Triacanthagyna	T. minosha	0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Triacanthagyna	T. obscuripennis	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Triacanthagyna	T. satyrus	0	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Triacanthagyna	T. septima	X	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Triacanthagyna	T. trifida	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Triacanthagyna	T. williamsoni	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total number in the family		23	56	45	27	55	9	27	1	2	2	2	2	1	2	1	0	0	3	1	0	0	3	3	0	0	0	0	0	0	0
Gomphidae																															
Agriogomphus	A. jessei	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Agriogomphus	A. sylvicola	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aphylla	A. barbata	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aphylla	A. boliviana	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aphylla	A. brasiliensis	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aphylla	A. brevipes	0	0	0	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aphylla	A. caudalis	0	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aphylla	A. dentata	0	X	X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aphylla	A. distinquenda	0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aphylla	A. edentata	0	X	0	0	X	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Aphylla	A. exilis	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aphylla	A. janirae	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aphylla	A. linea	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aphylla	A. molossus	X	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aphylla	A. producta	0	X	X	X	X	X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aphylla	A. robusta	0	X	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aphylla	A. scapula	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aphylla	A. silvatica	0	X	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aphylla	A. spinula	0	X	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aphylla	A. tenuis	X	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aphylla	A. theodorina	0	X	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Archaeogomphus	A. densus	0	0	0	0	0	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Archaeogomphus	A. furcatus	X	X	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Archaeogomphus	A. globulus	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Archaeogomphus	A. hamatus	X	X	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Archaeogomphus	A. infans	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Archaeogomphus	A. nanus	0	0	0	X	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Archaeogomphus	A. vanbrinkae	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brasiliogomphus	B. uniseries	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cacoides	C. latro	0	0	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyanogomphus	C. comparabilis	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cyanogomphus	C. waltheri	0	0	0	0	0	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Desmogomphus	D. paucinervis	X	0	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Desmogomphus	D. tigrivensis	0	0	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diaphlebia	D. angustipennis	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diaphlebia	D. nexans	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ebegomphus	E. conchinus	0	0	0	X	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ebegomphus	E. minutus	0	0	0	X	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epigomphus	E. armatus	0	X	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epigomphus	E. gibberosus	0	X	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epigomphus	E. hylaeus	0	X	X	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epigomphus	E. llama	0	X	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epigomphus	E. obtusus	X	X	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epigomphus	E. occipitalis	0	X	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epigomphus	E. paludosus	0	0	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Epigomphus	E. pechumani	X	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erpetogomphus	E. sabaleticus	X	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gomphoides	G. infumata	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gomphoides	G. perdita	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gomphoides	G. praevia	0	0	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Idiogomphoides	I. demoulini	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Idiogomphoides	I. emmeli	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Idiogomphoides	I. ictinia	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Melanocacus	M. mungo	0	0	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neogomphus	N. edenticulatus	0	0	0	0	0	0	X		0	0	0	0	0	0	X	0	0	X	X	X	X	0	0	0	X	0	0	0	0	0	X
Neogomphus	N. molestus	0	0	0	0	0	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peruviogomphus	P. bellei	0	0	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peruviogomphus	P. moyobambus	0	X	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Peruviogomphus	P. pearsoni	0	0	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllocycla	P. anduzei	X	X	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllocycla	P. argentina	0	0	0	0	X	X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllocycla	P. armata	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllocycla	P. bartica	0	0	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllocycla	P. basidenta	0	0	0	0	0	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllocycla	P. brasilia	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllocycla	P. diphylla	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllocycla	P. gladiata	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllocycla	P. hamata	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllocycla	P. hespera	0	0	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllocycla	P. malkini	0	X	X	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllocycla	P. medusa	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllocycla	P. modesta	0	0	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllocycla	P. murrea	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllocycla	P. neotropica	0	0	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllocycla	P. ophis	0	0	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllocycla	P. pallida	0	0	0	0	X	X	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllocycla	P. pegasus	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllocycla	P. propinqua	0	0	0	0	X	X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllocycla	P. signata	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllocycla	P. sordida	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllocycla	P. titschacki	0	X	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllocycla	P. uniforma	0	X	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllocycla	P. vesta	0	0	0	0	0	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllocycla	P. viridipleuris	0	0	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllocycla	P. volsella	X	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllogomphoides	P. aculeus	0	X	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllogomphoides	P. andromeda	0	0	0	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllogomphoides	P. angularis	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllogomphoides	P. annectens	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllogomphoides	P. atlanticus	0	0	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllogomphoides	P. brunneus	0	0	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllogomphoides	P. calverti	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllogomphoides	P. camposi	0	0	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllogomphoides	P. cepheus	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllogomphoides	P. cornutifrons	X	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllogomphoides	P. cristatus	0	0	0	X	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllogomphoides	P. fuliginosus	0	0	0	X	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllogomphoides	P. insignatus	X	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllogomphoides	P. joaquini	0	0	0	0	0	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllogomphoides	P. lieftincki	0	X	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllogomphoides	P. major	0	0	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllogomphoides	P. pedunculus	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllogomphoides	P. praedatrix	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllogomphoides	P. pseudangularis	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllogomphoides	P. regularis	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllogomphoides	P. selysi	0	X	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllogomphoides	P. semicircularis	X	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllogomphoides	P. spiniventris	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllogomphoides	P. suspectus	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phyllogomphoides	P. undulatus	0	0	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Praeviogomphus	P. proprius	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. abbreviatus	X	0	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. aberrans	0	0	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. amazonicus	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. anomalus	0	X	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. angeloi	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. approximatus	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. auropictus	0	0	0	0	0	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. australis	0	0	0	0	0	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. basalis	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. basistictus	0	0	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. bidentatus	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. boliviensis	0	X	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. brachycnemis	0	0	0	X	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. complicatus	0	0	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. costalis	0	0	0	0	X	X	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. delicatus	0	X	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. dorsopallidus	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. elegans	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. fassli	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. formalis	0	X	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. geijskesi	0	0	0	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. gracilis	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. guyanensis	0	0	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. incurvatus	X	X	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Progomphus	P. intricatus		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. joergenseni		0	X	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. kimminsi		0	0	0	0	0	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. lepidus		0	0	0	0	X	X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. maculatus		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. microcephalus		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. nervis		0	X	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. nigellus		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. perpusillus		0	X	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. phyllochromus		X	X	X	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. pijpersi		0	0	X	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. pygmaeus		X	X	X	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. recticarinatus		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. tantillus		0	0	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. tibialis		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. victor		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Progomphus	P. virginiae		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tibiagomphus	T. noval		0	0	0	0	0	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tibiagomphus	T. uncatus		0	0	0	0	X	X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zonophora	Z. batesi		0	0	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zonophora	Z. calippus		0	X	X	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zonophora	Z. campanulata		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zonophora	Z. diversa		0	0	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zonophora	Z. nobilis		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zonophora	Z. supratriangularis		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zonophora	Z. surinamensis		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zonophora	Z. wucherpfennigi		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Total number in the family	19	36	26	27	105	7	29		0	0	0	0	0	0	1	0	0	1	1	1	1	0	0	0	1	0	0	0	0	0	1
Neopetaliidae																																	
Neopetalia	N. punctata		0	0	0	0	0	0	X		0	0	0	0	0	0	X	X	0	X	X	X	X	0	0	0	X	0	0	0	0	0	X
		Total number in the family	0	0	0	0	0	0	1		0	0	0	0	0	0	1	1	0	1	1	1	1	0	0	0	1	0	0	0	0	0	1
Synthemistidae																																	
Gomphomacromia	G. fallax		0	X	X	0	0	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gomphomacromia	G. nodisticta		0	0	0	0	0	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gomphomacromia	G. paradoxa		0	X	0	0	0	0	X		0	X	0	0	0	0	X	0	0	X	0	0	X	0	0	0	X	0	0	0	0	0	0
		Total number in the family	0	2	1	0	0	0	3		0	1	0	0	0	0	1	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0
Corduliidae																																	
Lauromacromia	L. bedei		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lauromacromia	L. dubitalis		0	0	0	X	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lauromacromia	L. flaviae		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lauromacromia	L. luismoojeni		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lauromacromia	L. melanica		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lauromacromia	L. picinguaba		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Navicordulia	N. amazonica		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Navicordulia	N. atlantica		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Navicordulia	N. errans		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Navicordulia	N. kiautai		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Navicordulia	N. leptostyla		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Navicordulia	N. longistyla		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Navicordulia	N. mielkei		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Navicordulia	N. miersi		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neocordulia	N. androgynis		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neocordulia	N. batesi		X	X	X	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neocordulia	N. carlochagasi		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neocordulia	N. mambucabensis		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neocordulia	N. matutuensis		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neocordulia	N. santacatarinensis		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neocordulia	N. setifera		0	0	X	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Neocordulia	N. volxemi		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aeschnosoma	A. auripennis		0	0	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aeschnosoma	A. elegans		0	0	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aeschnosoma	A. forcipula		0	X	0	X	X	0	0		0	X	0	X	X	0	0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Aeschnosoma	A. marizae		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aeschnosoma	A. louissiriusi		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aeschnosoma	A. pseudoforcipula		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aeschnosoma	A. hamadae		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Aeschnosoma	A. heliophila		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Agriogomphus	A. sylvicola		0	0	X	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cordulisantosia	C. marshalli		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cordulisantosia	C. newtoni		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paracordulia	P. sericea		0	X	0	X	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rialla	R. villosa		0	0	0	0	0	0	X		0	0	0	0	0	0	X	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
		Total number in the family	1	3	3	5	32	0	2		0	1	0	1	1	0	1	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0
Libellulidae																																	
Anatya	A. guttata		X	X	X	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Anatya	A. januaria		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Antidythemis	A. trameiformis		0	0	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Argyrothemis	A. argentea		0	X	X	X	X	0	0		0	X	X	X	X	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Brachymesia	B. furcata		X	X	X	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachymesia	B. herbida		X	X	X	0	X	0	X		X	X	X	0	X	0	X	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Brechmorhoga	B. flavoannulata		0	X	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brechmorhoga	B. flavopunctata		X	X	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brechmorhoga	B. nubecula		X	X	X	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brechmorhoga	B. pertinax		X	X	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brechmorhoga	B. praecox		X	X	X	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brechmorhoga	B. praedatrix		0	0	0	X	X	0	X		0	0	0	X	X	0	X	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Brechmorhoga	B. rapax		X	X	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brechmorhoga	B. travassosi		0	0	0	X	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brechmorhoga	B. tepeaca		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brechmorhoga	B. vivax		X	X	X	0	0	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cannaphila	C. mortoni		X	0	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cannaphila	C. vibex		X	X	X	0	0	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Carajathemis	C. simone		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dasythemis	D. esmeralda		X	X	X	X	X	0	0		X	X	X	X	X	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Dasythemis	D. essequiba		0	X	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dasythemis	D. mincki		0	X	0	0	X	X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dasythemis	D. venosa		0	0	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diastatops	D. dimidiata		0	0	0	X	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diastatops	D. emilia		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diastatops	D. estherae		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diastatops	D. intensa		X	X	0	0	X	X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diastatops	D. nigra		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diastatops	D. obscura		X	X	0	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diastatops	D. pullata		0	X	X	X	X	0	X		0	X	X	X	X	0	X	0	0	X	X	0	X	0	0	0	0	0	0	0	0	0	X
Dythemis	D. nigra		0	0	0	X	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dythemis	D. multipuctata		X	X	X	0	0	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dythemis	D. sterilis		X	X	X	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Edonis	E. helena		0	0	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Elasmothemis	E. cannacrioides		X	X	X	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Elasmothemis	E. constricta		0	0	0	0	X	X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Elasmothemis	E. rufa		0	0	0	X	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Elasmothemis	E. schubarti		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Elasmothemis	E. williamsoni		0	0	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Elga	E. leptostyla		X	X	X	X	X	0	0		X	X	X	X	X	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Elga	E. newtonsantosi		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythemis	E. attala		X	X	X	X	X	X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythemis	E. carmelita		X	X	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythemis	E. credula		X	X	X	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythemis	E. haematogastra		X	X	X	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythemis	E. mithroides		X	X	X	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythemis	E. peruviana		X	X	X	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythemis	E. plebeja		X	X	X	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythemis	E. vesiculosa		X	X	X	X	X	0	X		X	X	X	X	X	0	X	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. abiecta		X	0	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. acantha		0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Erythrodiplax	E. amazonica	0	X	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. anatoidea	0	X	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. andagoya	X	0	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. angustipennis	0	X	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. anomala	0	0	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. atroterminata	0	0	0	0	X	X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. attenuata	X	X	X	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. avittata	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. basalis	X	X	X	X	X	X	X		X	X	X	X	X	X	X	0	0	X	X	0	0	0	0	0	X	0	0	0	0	0	X
Erythrodiplax	E. berenice	X	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. branconensis	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. castanea	X	X	X	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. cauca	X	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. chromoptera	0	0	0	0	X	X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. cleopatra	0	X	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. clitella	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. connata	X	0	X	0	0	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. corallina	0	X	0	0	0	X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. famula	X	X	0	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. fervida	X	0	X	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. fulva	0	0	0	X	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. funerea	X	0	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. fusca	X	X	X	X	X	X	X		X	X	X	X	X	X	X	0	0	X	X	0	0	0	X	0	X	0	0	0	0	0	X
Erythrodiplax	E. gomesi	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. hyalina	0	0	0	0	X	X	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. ines	X	X	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. juliana	X	X	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. kimminsi	X	X	X	0	0	0	0		X	X	X	0	0	0	0	0	0	0	0	0	0	0	0	0	X	0	0	0	0	0	0
Erythrodiplax	E. latimaculata	0	0	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. lativittata	X	X	X	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. laurentia	0	0	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. leticia	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. longitudinalis	0	0	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. luteofrons	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. lygaea	0	0	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. maculosa	0	0	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. media	0	0	0	0	X	X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. melanica	0	X	X	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. melanorubra	0	X	X	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. minuscula	X	0	0	0	0	0	0		X	0	0	0	0	0	0	0	X	X	X	X	X	X	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. nigricans	0	0	0	0	X	X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. nivea	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. ochracea	X	X	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. pallida	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. paraguayensis	X	0	X	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. parvimaculata	0	0	X	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. solimaea	0	X	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. tenuis	0	X	X	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Erythrodiplax	E. umbrata	X	X	X	X	X	X	X		X	X	X	X	X	X	X	0	0	X	X	0	0	0	0	0	X	0	0	0	0	0	X
Erythrodiplax	E. unimaculata	X	X	X	X	X	0	0		X	X	X	X	X	0	0	0	0	X	X	0	0	0	0	0	X	0	0	0	0	0	X
Erythrodiplax	E. venusta	X	X	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fylgia	F. amazonica	0	X	X	X	X	0	0		0	X	X	X	X	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Garrisonia	G. aurindae	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gynothemis	G. aurea	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gynothemis	G. pumila	X	X	X	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gynothemis	G. uniseta	0	0	0	X	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gynothemis	G. venipunctata	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Idiataphe	I. amazonica	X	X	0	X	X	0	0		X	X	0	X	X	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Idiataphe	I. batesi	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Idiataphe	I. cubensis	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Idiataphe	I. longipes	X	X	X	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Libellula	L. herculea	X	X	X	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. absimilis	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. brevidens	0	0	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. capitata	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. declivata	0	X	0	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. delia	0	0	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. extensa	0	X	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. fallax	X	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. flavescens	0	X	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. guarauno	0	0	0	X	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. hahneli	X	X	X	0	0	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. hemichlora	X	X	X	X	X	0	X		X	X	X	X	X	0	X	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. heteronycha	0	0	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. hosanai	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. idalia	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. imitans	X	0	X	X	X	X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. inacuta	X	0	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. inequiunguis	X	0	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. lauriana	0	X	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. ludia	0	0	X	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. marmorata	0	0	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. mortoni	0	X	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. musiva	X	X	X	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. newtoni	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. nobilis	0	0	0	X	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. polyneura	0	X	0	0	0	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. pseudimitans	X	X	X	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. rupicola	0	0	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. taurepan	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. tenuis	0	0	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. tessellata	X	X	X	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Macrothemis	M. valida	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Miathyria	M. marcella	X	X	X	X	X	X	X		X	X	X	X	X	X	X	0	0	X	X	0	X	0	0	0	X	0	0	0	0	0	X
Miathyria	M. simplex	X	X	X	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. aequalis	X	X	X	X	X	0	0		X	X	X	X	X	0	0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. almeidai	0	0	X	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. artemis	0	X	0	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. athenais	0	0	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. atra	0	X	X	X	X	0	X		0	X	X	X	X	0	X	0	0	X	0	0	0	0	0	0	X	0	0	0	0	0	0
Micrathyria	M. borgmeieri	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. caerulistyla	0	X	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. cambridgei	0	0	0	X	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. catenata	0	X	X	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. coropinae	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. debilis	0	X	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. dictynna	X	X	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. dido	0	X	0	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. didyma	X	X	X	X	X	0	0		X	X	X	X	X	0	0	0	0	X	X	0	X	0	0	0	0	0	0	0	0	0	X
Micrathyria	M. divergens	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. dunklei	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. duplicata	0	X	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. dythemoides	0	X	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. eximia	X	0	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. hesperis	0	0	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. hippolyte	0	X	X	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. hypodidyma	0	0	0	0	X	X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. iheringi	0	0	X	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. kleerekoperi	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. laevigata	X	X	X	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. longifasciata	0	0	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. mengeri	X	X	X	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. occipita	0	X	X	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. ocellata	X	X	X	X	X	0	X		X	X	X	X	X	0	X	0	0	X	X	0	0	0	0	0	X	0	0	0	0	0	X
Micrathyria	M. paruensis	0	0	0	X	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

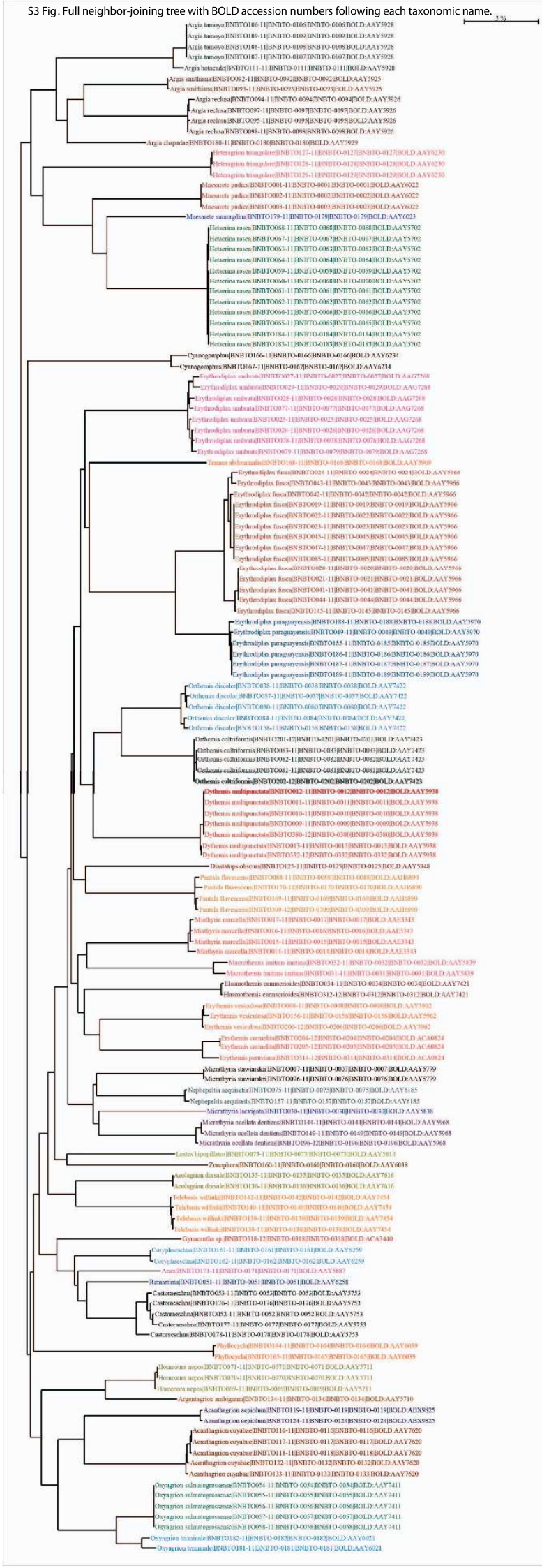
Micrathyria	M. pirassunungae	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. pseudeximia	X	X	X	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. pseudhypodidyma	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. ringueleti	0	0	0	0	0	X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. romani	0	X	X	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. spinifera	0	X	X	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. spuria	X	0	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. stawiarskii	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. surinamensis	0	0	0	X	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. sympriona	0	X	X	X	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. tibialis	X	X	X	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. ungulata	0	X	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Micrathyria	M. venezuelae	0	0	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Misagria	M. calverti	0	X	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Misagria	M. divergens	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Misagria	M. parana	0	X	X	X	X	0	0		0	X	X	X	X	0	0	0	0	X	X	0	X	0	0	0	0	0	0	0	0	0	X
Nephepeltia	N. aequisetis	0	0	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nephepeltia	N. berlai	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nephepeltia	N. flavifrons	X	X	X	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nephepeltia	N. flavipennis	0	0	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nephepeltia	N. leonardina	0	X	X	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nephepeltia	N. phryne	X	X	X	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Nothodiplax	N. dendrophila	0	0	0	X	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligoclada	O. abbreviata	0	X	X	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligoclada	O. amphinome	0	0	0	X	X	0	0		0	0	0	X	X	0	0	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Oligoclada	O. borrori	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligoclada	O. calverti	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligoclada	O. crocogaster	0	0	X	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligoclada	O. haywardi	0	0	0	0	0	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligoclada	O. heliophila	X	X	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligoclada	O. laetitia	0	0	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligoclada	O. monosticha	0	X	X	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligoclada	O. nemesis	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligoclada	O. pachystigma	0	X	X	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligoclada	O. rhea	0	0	0	X	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligoclada	O. risi	0	0	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligoclada	O. stenoptera	0	X	X	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligoclada	O. sylvia	0	X	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligoclada	O. teretidentis	0	0	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligoclada	O. umbricola	X	0	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligoclada	O. waikinimae	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligoclada	O. walkeri	0	X	X	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oligoclada	O. xanthopleura	0	X	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orionothemis	O. felixorioni	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthemis	O. aequilibris	X	X	0	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthemis	O. ambinigra	0	X	0	0	X	X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthemis	O. ambirufa	0	0	X	X	0	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthemis	O. anthracina	0	X	X	X	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthemis	O. attenuata	X	X	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthemis	O. biolleyi	X	X	X	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthemis	O. cinnamomea	0	0	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthemis	O. concolor	0	X	X	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthemis	O. coracina	0	0	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthemis	O. cultriformis	X	X	X	X	X	0	X		X	X	X	X	X	0	X	0	0	X	X	0	X	0	0	0	0	0	0	0	0	0	X
Orthemis	O. discolor	X	X	X	X	X	X	X		X	X	X	X	X	X	X	0	0	X	X	0	X	0	0	0	X	0	0	0	0	0	X
Orthemis	O. ferruginea	0	X	0	0	0	0	0		0	X	0	0	0	0	0	0	0	X	X	0	X	0	0	0	X	0	0	0	0	0	X
Orthemis	O. flavopicta	0	X	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthemis	O. nodiplaga	0	0	0	0	X	X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthemis	O. paulsoni	0	0	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthemis	O. regalis	0	X	X	X	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthemis	O. schmidti	0	X	X	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthemis	O. sulphurata	0	X	X	X	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Orthemis	O. tambopatae	0	0	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pantala	P. flavescens	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	0	X
Pantala	P. hymenaea	X	X	X	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perithemis	P. bella	0	X	X	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perithemis	P. capixaba	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perithemis	P. cornelia	0	X	X	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perithemis	P. domitia	X	X	X	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perithemis	P. electra	X	X	X	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perithemis	P. icteroptera	0	0	0	0	X	X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perithemis	P. lais	X	X	X	X	X	0	X		X	X	X	X	X	0	X	0	0	X	X	0	X	0	0	0	0	0	0	0	0	0	X
Perithemis	P. mooma	X	X	X	X	X	X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perithemis	P. parzefalli	0	X	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perithemis	P. rubita	0	X	X	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perithemis	P. thais	0	X	X	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Perithemis	P. tenera	X	0	0	0	0	0	0		X	0	0	0	0	0	0	0	0	X	X	X	X	0	0	0	X	0	0	0	0	0	0
Planiplax	P. arachne	0	X	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Planiplax	P. erythropyga	0	0	0	0	X	X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Planiplax	P. machadoi	0	X	X	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Planiplax	P. phoenicura	X	0	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodopygia	R. cardinalis	X	X	X	X	X	0	0		X	X	X	X	X	0	0	0	0	X	X	0	0	0	0	0	X	0	0	0	0	0	X
Rhodopygia	R. geijskesi	0	0	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodopygia	R. hinei	0	0	X	0	0	0	0		0	0	X	0	0	0	0	0	0	X	X	0	0	0	0	0	X	0	0	0	0	0	X
Rhodopygia	R. hollandi	0	X	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Rhodopygia	R. pruinosa	0	0	X	X	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sympetrum	S. gilvum	X	X	X	0	0	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sympetrum	S. illotum	X	0	0	0	0	0	0		X	0	0	0	0	0	0	X	0	X	0	X	0	0	0	0	X	X	X	X	0	0	0
Sympetrum	S. roraimae	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sympetrum	S. villosum	0	0	0	0	0	0	X		0	0	0	0	0	0	X	X	0	X	X	X	0	0	0	0	X	X	X	X	0	0	X
Tauriphila	T. argo	0	X	X	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tauriphila	T. australis	X	X	X	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tauriphila	T. risi	0	0	0	0	0	X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tauriphila	T. xiphea	0	0	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tholymis	T. citrina	X	X	X	X	X	0	X		X	X	X	X	X	0	X	X	0	X	X	0	X	0	0	0	X	0	0	0	0	0	X
Tramea	T. abdominalis	X	X	X	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tramea	T. binotata	X	X	X	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tramea	T. calverti	X	X	X	X	X	0	X		X	X	X	X	X	0	X	0	0	X	X	0	X	0	0	0	X	0	0	0	0	0	X
Tramea	T. cophysa	X	X	X	0	X	X	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tramea	T. minuta	0	0	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tramea	T. rustica	X	0	0	X	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Uracis	U. fastigiata	X	X	X	X	X	0	0		X	X	X	X	X	0	0	0	0	X	X	0	X	0	0	0	X	0	0	0	0	0	X
Uracis	U. imbuta	X	X	X	X	X	0	X		X	X	X	X	X	0	X	0	0	0	0	0	X	0	0	0	0	0	0	0	0	0	0
Uracis	U. infumata	X	X	X	X	X	0	0		X	X	X	X	X	0	0	0	0	X	X	0	0	0	0	0	X	0	0	0	0	0	X
Uracis	U. ovipositrix	0	X	X	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Uracis	U. reducta	0	X	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Uracis	U. siemensi	X	X	X	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ypirangathemis	Y. calverti	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zenithoptera	Z. anceps	0	0	0	0	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zenithoptera	Z. fasciata	X	X	X	X	X	0	0		X	X	X	X	X	0	0	0	0	0	X	0	X	0	0	0	0	0	0	0	0	0	0
Zenithoptera	Z. lanei	0	X	0	0	X	0	X		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Zenithoptera	Z. viola	X	X	0	X	X	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total number in the family	106	150	133	120	221	26	102		29	32	31	31	32	6	19	4	2	25	25	5	27	2	2	1	19	3	3	3	1	0	21
	Total number in Anisoptera	149	247	208	179	413	42	166		30	36	33	34	35	7	26	6	3	29	33	9	33	3	5	4	22	3	3	3	1	0	24

Chapter 3

S3 Fig. Full neighbor-joining tree with BOLD accession numbers following each taxonomic name.

S4 Table. Metadata for each of the specimens used for the present study.

S3 Fig. Full neighbor-joining tree with BOLD accession numbers following each taxonomic name.



S4 Table. Metadata for each of the specimens used for the present study.

Sample ID	Phylum	Class	Order	Infraorder	Family	Subfamily	Genus	Species	Subspecies	Identifier	Sex	Life Stage	Process ID	Sample ID	Field ID	BIN	GenBank nos.	COI-5P Seq. Length	Depository institution	Museum deposit number	Collectors	Country	State	Municipality	Sector	Exact Site	Latitude	Longitude
BNBTO-0001	Arthropoda	Insecta	Odonata	Zygoptera	Calopterygidae	Calopteryginae	Mnesarete	Mnesarete pudica		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO001-11	BNBTO-0001	BNBTO-0001	BOLD:AAY6022	KY947357	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO001	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Dourados		Corrego Azulao	-22.2	-55.18
BNBTO-0002	Arthropoda	Insecta	Odonata	Zygoptera	Calopterygidae	Calopteryginae	Mnesarete	Mnesarete pudica		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO002-11	BNBTO-0002	BNBTO-0002	BOLD:AAY6022	KY947358	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO002	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Dourados		Corrego Azulao	-22.2	-55.18
BNBTO-0003	Arthropoda	Insecta	Odonata	Zygoptera	Calopterygidae	Calopteryginae	Mnesarete	Mnesarete pudica		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO003-11	BNBTO-0003	BNBTO-0003	BOLD:AAY6022	KY947359	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO003	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Dourados		Corrego Azulao	-22.2	-55.18
BNBTO-0007	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Brachydiplacinae	Micrathyria	Micrathyria stawiarskii		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO007-11	BNBTO-0007	BNBTO-0007	BOLD:AAY5779	KY947360	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO007	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Bodoquena	Fazenda California	Corrego Ouro Verde	-20.717172	-56.852892
BNBTO-0008	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythemis	Erythemis vesiculosa		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO008-11	BNBTO-0008	BNBTO-0008	BOLD:AAY5962	KY947361	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO008	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Rio Espinilho	-21.625533	-56.938061
BNBTO-0009	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Trithemistinae	Dythemis	Dythemis multipunctata		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO009-11	BNBTO-0009	BNBTO-0009	BOLD:AAY5938	KY947362	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO009	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Bodoquena	Fazenda California	Corrego Nascente da Gruta	-20.7267	-56.850883
BNBTO-0010	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Trithemistinae	Dythemis	Dythemis multipunctata		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO010-11	BNBTO-0010	BNBTO-0010	BOLD:AAY5938	KY947363	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO010	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego das Pedras	-21.693339	-56.944481
BNBTO-0011	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Trithemistinae	Dythemis	Dythemis multipunctata		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO011-11	BNBTO-0011	BNBTO-0011	BOLD:AAY5938	KY947364	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO011	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Bela Vista		Rio Margarida	-21.679861	-56.762414
BNBTO-0012	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Trithemistinae	Dythemis	Dythemis multipunctata		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO012-11	BNBTO-0012	BNBTO-0012	BOLD:AAY5938	KY947365	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO012	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Bela Vista		Rio Margarida	-21.679861	-56.762414
BNBTO-0013	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Trithemistinae	Dythemis	Dythemis multipunctata		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO013-11	BNBTO-0013	BNBTO-0013	BOLD:AAY5938	KY947366	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO013	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego das Pedras	-21.693339	-56.944481
BNBTO-0014	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Trameinae	Miathyria	Miathyria marcella		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO014-11	BNBTO-0014	BNBTO-0014	BOLD:AAE3343	KY947367	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO014	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego Sujo	-21.655356	-56.970436
BNBTO-0015	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Trameinae	Miathyria	Miathyria marcella		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO015-11	BNBTO-0015	BNBTO-0015	BOLD:AAE3343	KY947368	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO015	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego Sujo	-21.655356	-56.970436
BNBTO-0016	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Trameinae	Miathyria	Miathyria marcella		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO016-11	BNBTO-0016	BNBTO-0016	BOLD:AAE3343	KY947369	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO016	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego Sujo	-21.655356	-56.970436
BNBTO-0017	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Trameinae	Miathyria	Miathyria marcella		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO017-11	BNBTO-0017	BNBTO-0017	BOLD:AAE3343	KY947370	646bp	Universidade Federal de Mato Grosso do Sul	BNBTO017	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Bodoquena	Fazenda California	Corrego Ouro Verde	-20.717172	-56.852892
BNBTO-0019	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax fusca		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO019-11	BNBTO-0019	BNBTO-0019	BOLD:AAY5966	KY947371	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO019	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Rio Perdido	-21.641347	-56.961433
BNBTO-0020	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax fusca		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO020-11	BNBTO-0020	BNBTO-0020	BOLD:AAY5966	KY947372	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO020	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego Coqueiro	-21.694083	-56.949522
BNBTO-0021	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax fusca		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO021-11	BNBTO-0021	BNBTO-0021	BOLD:AAY5966	KY947373	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO021	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Bodoquena	Fazenda California	Corrego Nascente da Gruta	-20.7267	-56.850883
BNBTO-0022	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax fusca		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO022-11	BNBTO-0022	BNBTO-0022	BOLD:AAY5966	KY947374	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO022	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Bodoquena	Fazenda California	Corrego Nascente da Gruta	-20.7267	-56.850883
BNBTO-0023	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax fusca		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO023-11	BNBTO-0023	BNBTO-0023	BOLD:AAY5966	KY947375	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO023	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego Sacuri	-21.635172	-56.933808
BNBTO-0024	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax fusca		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO024-11	BNBTO-0024	BNBTO-0024	BOLD:AAY5966	KY947376	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO024	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol	Fazenda Italia	Corrego da Volta	-21.657725	-56.967581
BNBTO-0025	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax umbrata		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO025-11	BNBTO-0025	BNBTO-0025	BOLD:AAG7268	KY947377	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO025	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego Sacuri	-21.635172	-56.933808
BNBTO-0026	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax umbrata		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO026-11	BNBTO-0026	BNBTO-0026	BOLD:AAG7268	KY947378	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO026	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Rio Espinilho	-21.625533	-56.938061
BNBTO-0027	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax umbrata		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO027-11	BNBTO-0027	BNBTO-0027	BOLD:AAG7268	KY947379	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO027	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Rio Espinilho	-21.625533	-56.938061
BNBTO-0028	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax umbrata		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO028-11	BNBTO-0028	BNBTO-0028	BOLD:AAG7268	KY947380	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO028	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego Sacuri	-21.635172	-56.933808
BNBTO-0029	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax umbrata		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO029-11	BNBTO-0029	BNBTO-0029	BOLD:AAG7268	KY947381	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO029	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Bodoquena	Fazenda California	Corrego Oco do Sapo	-20.700042	-56.860775
BNBTO-0030	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Brachydiplacinae	Micrathyria	Micrathyria laevigata		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO030-11	BNBTO-0030	BNBTO-0030	BOLD:AAY5838	KY947382	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO030	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Bodoquena	Fazenda California	Corrego da Casa	-20.714081	-56.867833
BNBTO-0031	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Trithemistinae	Macrothemis	Macrothemis imitans	Macrothemis imitans imitans	Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO031-11	BNBTO-0031	BNBTO-0031	BOLD:AAY5839	KY947383	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO031	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego das Pedras	-21.693339	-56.944481
BNBTO-0032	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Trithemistinae	Macrothemis	Macrothemis imitans	Macrothemis imitans imitans	Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO032-11	BNBTO-0032	BNBTO-0032	BOLD:AAY5839	KY947384	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO032	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego Sacuri	-21.635172	-56.933808
BNBTO-0034	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Libellulinae	Elasmothemis	Elasmothemis cannacrioides		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO034-11	BNBTO-0034	BNBTO-0034	BOLD:AAY7421	KY947385	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO034	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego da Laje	-21.689736	-56.938231
BNBTO-0037	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Libellulinae	Orthemis	Orthemis discolor		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO037-11	BNBTO-0037	BNBTO-0037	BOLD:AAY7422	KY947386	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO037	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego da Laje	-21.689736	-56.938231
BNBTO-0038	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Libellulinae	Orthemis	Orthemis discolor		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO038-11	BNBTO-0038	BNBTO-0038	BOLD:AAY7422	KY947387	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO038	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Bodoquena	Fazenda California	Corrego da Casa	-20.714081	-56.867833
BNBTO-0041	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax fusca		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO041-11	BNBTO-0041	BNBTO-0041	BOLD:AAY5966	KY947388	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO041	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego Morro do Cateto	-21.678017	-56.954647
BNBTO-0042	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax fusca		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO042-11	BNBTO-0042	BNBTO-0042	BOLD:AAY5966	KY947389	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO042	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego Sacuri	-21.635172	-56.933808
BNBTO-0043	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax fusca		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO043-11	BNBTO-0043	BNBTO-0043	BOLD:AAY5966	KY947390	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO043	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol	Fazenda Italia	Corrego da Volta	-21.657725	-56.967581
BNBTO-0044	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax fusca		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO044-11	BNBTO-0044	BNBTO-0044	BOLD:AAY5966	KY947391	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO044	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego da Estrada	-21.655717	-56.938372
BNBTO-0045	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax fusca		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO045-11	BNBTO-0045	BNBTO-0045	BOLD:AAY5966	KY947392	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO045	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego Sacuri	-21.635172	-56.933808
BNBTO-0047	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax fusca		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO047-11	BNBTO-0047	BNBTO-0047	BOLD:AAY5966	KY947393	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO047	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego do Cachorro	-21.649356	-56.950781
BNBTO-0049	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax paraguayensis		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO049-11	BNBTO-0049	BNBTO-0049	BOLD:AAY5970	KY947394	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO049	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego Sacuri	-21.635172	-56.933808
BNBTO-0054	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Ischnurinae	Oxyagrion	Oxyagrion sulmatogrossense		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO054-11	BNBTO-0054	BNBTO-0054	BOLD:AAY7411	KY947395	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO054	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego Morro do Cateto	-21.678017	-56.954647
BNBTO-0055	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Ischnurinae	Oxyagrion	Oxyagrion sulmatogrossense		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO055-11	BNBTO-0055	BNBTO-0055	BOLD:AAY7411	KY947396	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO055	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego da Laje	-21.689736	-56.938231
BNBTO-0056	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Ischnurinae	Oxyagrion	Oxyagrion sulmatogrossense		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO056-11	BNBTO-0056	BNBTO-0056	BOLD:AAY7411	KY947397	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO056	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego Morro do Cateto	-21.678017	-56.954647
BNBTO-0057	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Ischnurinae	Oxyagrion	Oxyagrion sulmatogrossense		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO057-11	BNBTO-0057	BNBTO-0057	BOLD:AAY7411	KY947398	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO057	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Rio Divisa	-21.712522	-56.837661
BNBTO-0058	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Ischnurinae	Oxyagrion	Oxyagrion sulmatogrossense		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO058-11	BNBTO-0058	BNBTO-0058	BOLD:AAY7411	KY947399	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO058	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego Morro do Cateto	-21.678017	-56.954647
BNBTO-0059	Arthropoda	Insecta	Odonata	Zygoptera	Calopterygidae	Hetaerininae	Hetaerina	Hetaerina rosea		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO059-11	BNBTO-0059	BNBTO-0059	BOLD:AAY5702	KY947400	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO059	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego do Cachorro	-21.649356	-56.950781
BNBTO-0060	Arthropoda	Insecta	Odonata	Zygoptera	Calopterygidae	Hetaerininae	Hetaerina	Hetaerina rosea		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO060-11	BNBTO-0060	BNBTO-0060	BOLD:AAY5702	KY947401	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO060	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego Sujo	-21.655356	-56.970436
BNBTO-0061	Arthropoda	Insecta	Odonata	Zygoptera	Calopterygidae	Hetaerininae	Hetaerina	Hetaerina rosea		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO061-11	BNBTO-0061	BNBTO-0061	BOLD:AAY5702	KY947402	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO061	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego Sujo	-21.655356	-56.970436
BNBTO-0062	Arthropoda	Insecta	Odonata	Zygoptera	Calopterygidae	Hetaerininae	Hetaerina	Hetaerina rosea		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO062-11	BNBTO-0062	BNBTO-0062	BOLD:AAY5702	KY947403	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO062	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Bodoquena	Fazenda California	Corrego Oco do Sapo	-20.700042	-56.860775
BNBTO-0063	Arthropoda	Insecta	Odonata	Zygoptera	Calopterygidae	Hetaerininae	Hetaerina	Hetaerina rosea		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO063-11	BNBTO-0063	BNBTO-0063	BOLD:AAY5702	KY947404	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO063	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Bela Vista		Corrego Feio	-21.680464	-56.764306
BNBTO-0064	Arthropoda	Insecta	Odonata	Zygoptera	Calopterygidae	Hetaerininae	Hetaerina	Hetaerina rosea		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO064-11	BNBTO-0064	BNBTO-0064	BOLD:AAY5702	KY947405	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO064	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego do Cachorro	-21.649356	-56.950781
BNBTO-0065	Arthropoda	Insecta	Odonata	Zygoptera	Calopterygidae	Hetaerininae	Hetaerina	Hetaerina rosea		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO065-11	BNBTO-0065	BNBTO-0065	BOLD:AAY5702	KY947406	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO065	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego da Estrada	-21.655717	-56.938372
BNBTO-0066	Arthropoda	Insecta	Odonata	Zygoptera	Calopterygidae	Hetaerininae	Hetaerina	Hetaerina rosea		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO066-11	BNBTO-0066	BNBTO-0066	BOLD:AAY5702	KY947407	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO066	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego Sujo	-21.655356	-56.970436
BNBTO-0067	Arthropoda	Insecta	Odonata	Zygoptera	Calopterygidae	Hetaerininae	Hetaerina	Hetaerina rosea		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO067-11	BNBTO-0067	BNBTO-0067	BOLD:AAY5702	KY947408	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO067	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Bodoquena	Fazenda California	Corrego Nascente da Gruta	-20.7267	-56.850883
BNBTO-0068	Arthropoda	Insecta	Odonata	Zygoptera	Calopterygidae	Hetaerininae	Hetaerina	Hetaerina rosea		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO068-11	BNBTO-0068	BNBTO-0068	BOLD:AAY5702	KY947409	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO068	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego das Pedras	-21.693339	-56.944481
BNBTO-0069	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Ischnurinae	Homeoura	Homeoura nepos		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO069-11	BNBTO-0069	BNBTO-0069	BOLD:AAY5711	KY947410	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO069	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol	Fazenda Italia	Corrego da Volta	-21.657725	-56.967581
BNBTO-0070	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Ischnurinae	Homeoura	Homeoura nepos		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO070-11	BNBTO-0070	BNBTO-0070	BOLD:AAY5711	KY947411	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO070	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego Sujo	-21.655356	-56.970436
BNBTO-0071	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Ischnurinae	Homeoura	Homeoura nepos		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO071-11	BNBTO-0071	BNBTO-0071	BOLD:AAY5711	KY947412	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO071	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol	Fazenda Italia	Corrego da Volta	-21.657725	-56.967581
BNBTO-0073	Arthropoda	Insecta	Odonata	Zygoptera	Lestidae	Lestinae	Lestes	Lestes bipupillatus		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO073-11	BNBTO-0073	BNBTO-0073	BOLD:AAY5814	KY947413	651bp	Universidade Federal de Mato Grosso do Sul	BNBTO073	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho		Corrego Pão de Açucar	-21.457247	-57.898944
BNBTO-0075	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Brachydiplacinae	Nephepeltia	Nephepeltia aequisetis		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO075-11	BNBTO-0075	BNBTO-0075	BOLD:AAY6185	KY947414	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO075	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho		Corrego Cristalino	-21.953475	-57.599106
BNBTO-0076	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Brachydiplacinae	Micrathyria	Micrathyria stawiarskii		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO076-11	BNBTO-0076	BNBTO-0076	BOLD:AAY5779	KY947415	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO076	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Bodoquena	Fazenda California	Corrego Ouro Verde	-20.717172	-56.852892
BNBTO-0077	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax umbrata		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO077-11	BNBTO-0077	BNBTO-0077	BOLD:AAG7268	KY947416	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO077	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego Sujo	-21.655356	-56.970436
BNBTO-0078	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax umbrata		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO078-11	BNBTO-0078	BNBTO-0078	BOLD:AAG7268	KY947417	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO078	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Bodoquena	Fazenda California	Corrego Nascente da Gruta	-20.7267	-56.850883
BNBTO-0079	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax umbrata		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO079-11	BNBTO-0079	BNBTO-0079	BOLD:AAG7268	KY947418	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO079	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Bodoquena	Fazenda California	Corrego da Casa	-20.714081	-56.867833
BNBTO-0080	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Libellulinae	Orthemis	Orthemis discolor		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO080-11	BNBTO-0080	BNBTO-0080	BOLD:AAY7422	KY947419	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO080	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego da Laje	-21.689736	-56.938231
BNBTO-0081	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Libellulinae	Orthemis	Orthemis cultriformis		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO081-11	BNBTO-0081	BNBTO-0081	BOLD:AAY7423	KY947420	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO081	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego Morro do Cateto	-21.678017	-56.954647
BNBTO-0082	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Libellulinae	Orthemis	Orthemis cultriformis		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO082-11	BNBTO-0082	BNBTO-0082	BOLD:AAY7423	KY947421	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO082	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego Morro do Cateto	-21.678017	-56.954647
BNBTO-0083	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Libellulinae	Orthemis	Orthemis cultriformis		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO083-11	BNBTO-0083	BNBTO-0083	BOLD:AAY7423	KY947422	656bp	Universidade Federal de Mato Grosso do Sul	BNBTO083	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego Morro do Cateto	-21.678017	-56.954647
BNBTO-0084	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Libellulinae	Orthemis	Orthemis discolor		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO084-11	BNBTO-0084	BNBTO-0084	BOLD:AAY7422	KY947423	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO084	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Bodoquena	Fazenda California	Corrego Nascente da Gruta	-20.7267	-56.850883
BNBTO-0085	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax fusca		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO085-11	BNBTO-0085	BNBTO-0085	BOLD:AAY5966	KY947424	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO085	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho		Corrego Cristalino	-21.953475	-57.599106
BNBTO-0088	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Trameinae	Pantala	Pantala flavescens		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO088-11	BNBTO-0088	BNBTO-0088	BOLD:AAH6890	KY947425	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO088	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Bodoquena	Fazenda California	Corrego Nascente da Gruta	-20.7267	-56.850883
BNBTO-0092	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Argiinae	Argia	Argia smithiana		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO092-11	BNBTO-0092	BNBTO-0092	BOLD:AAY5925	KY947426	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO092	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego das Pedras	-21.693339	-56.944481
BNBTO-0093	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Argiinae	Argia	Argia smithiana		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO093-11	BNBTO-0093	BNBTO-0093	BOLD:AAY5925	KY947427	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO093	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Bodoquena	Fazenda California	Corrego Nascente da Gruta	-20.7267	-56.850883
BNBTO-0094	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Argiinae	Argia	Argia reclusa		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO094-11	BNBTO-0094	BNBTO-0094	BOLD:AAY5926	KY947428	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO094	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Bodoquena	Fazenda California	Corrego Oco do Sapo	-20.700042	-56.860775
BNBTO-0095	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Argiinae	Argia	Argia reclusa		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO095-11	BNBTO-0095	BNBTO-0095	BOLD:AAY5926	KY947429	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO095	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego da Laje	-21.689736	-56.938231
BNBTO-0097	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Argiinae	Argia	Argia reclusa		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO097-11	BNBTO-0097	BNBTO-0097	BOLD:AAY5926	KY947430	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO097	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Rio Divisa	-21.712522	-56.837661
BNBTO-0098	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Argiinae	Argia	Argia reclusa		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO098-11	BNBTO-0098	BNBTO-0098	BOLD:AAY5926	KY947431	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO098	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Bela Vista		Corrego Feio	-21.680464	-56.764306
BNBTO-0106	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Argiinae	Argia	Argia tamoyo		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO106-11	BNBTO-0106	BNBTO-0106	BOLD:AAY5928	KY947432	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO106	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho		Corrego Cristalino	-21.953475	-57.599106
BNBTO-0107	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Argiinae	Argia	Argia tamoyo		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO107-11	BNBTO-0107	BNBTO-0107	BOLD:AAY5928	KY947433	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO107	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego da Laje	-21.689736	-56.938231
BNBTO-0108	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Argiinae	Argia	Argia tamoyo		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO108-11	BNBTO-0108	BNBTO-0108	BOLD:AAY5928	KY947434	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO108	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho		Corrego Cristalino	-21.953475	-57.599106
BNBTO-0109	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Argiinae	Argia	Argia tamoyo		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO109-11	BNBTO-0109	BNBTO-0109	BOLD:AAY5928	KY947435	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO109	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego Coqueiro	-21.694083	-56.949522
BNBTO-0111	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Argiinae	Argia	Argia botacudo		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO111-11	BNBTO-0111	BNBTO-0111	BOLD:AAY5928	KY947436	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO111	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego Sujo	-21.655356	-56.970436
BNBTO-0116	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Ischnurinae	Acanthagrion	Acanthagrion cuyabae		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO116-11	BNBTO-0116	BNBTO-0116	BOLD:AAY7620	KY947437	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO116	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol		Corrego Sacuri	-21.635172	-56.933808
BNBTO-0117	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Ischnurinae	Acanthagrion	Acanthagrion cuyabae		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO117-11	BNBTO-0117	BNBTO-0117	BOLD:AAY7620	KY947438	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO117	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho		Corrego Cristalino	-21.953475	-57.599106
BNBTO-0118	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Ischnurinae	Acanthagrion	Acanthagrion cuyabae		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO118-11	BNBTO-0118	BNBTO-0118	BOLD:AAY7620	KY947439	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO118	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho		Corrego Pão de Açucar	-21.457247	-57.898944
BNBTO-0119	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Ischnurinae	Acanthagrion	Acanthagrion aepiolum		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO119-11	BNBTO-0119	BNBTO-0119	BOLD:ABX9825	KY947440	652bp	Universidade Federal de Mato Grosso do Sul	BNBTO119	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho		Corrego APA	-22.170175	-57.518256
BNBTO-0124	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Ischnurinae	Acanthagrion	Acanthagrion aepiolum		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO124-11	BNBTO-0124	BNBTO-0124	BOLD:ABX9825	KY947441	651bp	Universidade Federal de Mato Grosso do Sul	BNBTO124	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho		Corrego APA	-22.170175	-57.518256
BNBTO-0125	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Palpopleurinae	Diastatops	Diastatops obscura		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO125-11	BNBTO-0125	BNBTO-0125	BOLD:AAY5948	KY947442	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO125	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Alto Caracol	Fazenda Italia	Corrego da Volta	-21.657725	-56.967581
BNBTO-0127	Arthropoda	Insecta	Odonata	Zygoptera	Heteragrionidae		Heteragrion	Heteragrion triangulare		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO127-11	BNBTO-0127	BNBTO-0127	BOLD:AAY6230	KY947443	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO127	Marciel Elio Rodrigues	Brazil	Parana	Cascavel	Distrito Juvinopolis	Rio das Antas	-25.260694	-53.365325
BNBTO-0128	Arthropoda	Insecta	Odonata	Zygoptera	Heteragrionidae		Heteragrion	Heteragrion triangulare		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO128-11	BNBTO-0128	BNBTO-0128	BOLD:AAY6230	KY947444	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO128	Marciel Elio Rodrigues	Brazil	Parana	Cascavel	Distrito Juvinopolis	Rio das Antas	-25.260694	-53.365325
BNBTO-0129	Arthropoda	Insecta	Odonata	Zygoptera	Heteragrionidae		Heteragrion	Heteragrion triangulare		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO129-11	BNBTO-0129	BNBTO-0129	BOLD:AAY6230	KY947445	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO129	Marciel Elio Rodrigues	Brazil	Parana	Cascavel	Distrito Juvinopolis	Rio das Antas	-25.260694	-53.365325
BNBTO-0132	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Ischnurinae	Acanthagrion	Acanthagrion cuyabae		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO132-11	BNBTO-0132	BNBTO-0132	BOLD:AAY7620	KY947446	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO132	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho		Corrego Jango Fundo	-22.082386	-57.5785
BNBTO-0133	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Ischnurinae	Acanthagrion	Acanthagrion cuyabae		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO133-11	BNBTO-0133	BNBTO-0133	BOLD:AAY7620	KY947447	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO133	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho			-22.153597	-57.543536
BNBTO-0134	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Ischnurinae	Argentagrion	Argentagrion ambiguum		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO134-11	BNBTO-0134	BNBTO-0134	BOLD:AAY5710	KY947448	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO134	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho			-22.153597	-57.543536
BNBTO-0135	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Pseudagrioninae	Aeolagrion	Aeolagrion dorsale		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO135-11	BNBTO-0135	BNBTO-0135	BOLD:AAY7616	KY947449	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO135	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho			-22.153597	-57.543536
BNBTO-0136	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Pseudagrioninae	Aeolagrion	Aeolagrion dorsale		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO136-11	BNBTO-0136	BNBTO-0136	BOLD:AAY7616	KY947450	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO136	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho			-22.153597	-57.543536
BNBTO-0138	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Pseudagrioninae	Telebasis	Telebasis willinki		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO138-11	BNBTO-0138	BNBTO-0138	BOLD:AAY7454	KY947451	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO138	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho			-22.153597	-57.543536
BNBTO-0139	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Pseudagrioninae	Telebasis	Telebasis willinki		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO139-11	BNBTO-0139	BNBTO-0139	BOLD:AAY7454	KY947452	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO139	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho			-22.153597	-57.543536
BNBTO-0140	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Pseudagrioninae	Telebasis	Telebasis willinki		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO140-11	BNBTO-0140	BNBTO-0140	BOLD:AAY7454	KY947453	656bp	Universidade Federal de Mato Grosso do Sul	BNBTO140	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho			-22.153597	-57.543536
BNBTO-0142	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Pseudagrioninae	Telebasis	Telebasis willinki		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO142-11	BNBTO-0142	BNBTO-0142	BOLD:AAY7454	KY947454	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO142	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho			-22.153597	-57.543536
BNBTO-0144	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Brachydiplacinae	Micrathyria	Micrathyria ocellata	Micrathyria ocellata dentiens	Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO144-11	BNBTO-0144	BNBTO-0144	BOLD:AAY5968	KY947455	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO144	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho			-22.153597	-57.543536
BNBTO-0145	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax fusca		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO145-11	BNBTO-0145	BNBTO-0145	BOLD:AAY5966	KY947456	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO145	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho			-22.153597	-57.543536
BNBTO-0149	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Brachydiplacinae	Micrathyria	Micrathyria ocellata	Micrathyria ocellata dentiens	Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO149-11	BNBTO-0149	BNBTO-0149	BOLD:AAY5968	KY947457	658bp	Universidade Federal de Mato Grosso do Sul	BNBTO149	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho			-22.153597	-57.543536

BNBTO-0156	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythemis	Erythemis vesiculosa		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO156-11	BNBTO-0156	BNBTO-0156	BOLD:AAY5962	KY947458		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO156	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho				-22.153597	-57.543536							
BNBTO-0157	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Brachydiplacinae	Nephepeltia	Nephepeltia aequisetis		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO157-11	BNBTO-0157	BNBTO-0157	BOLD:AAY6185	KY947459		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO157	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho				-22.153597	-57.543536							
BNBTO-0158	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Libellulinae	Orthemis	Orthemis discolor		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO158-11	BNBTO-0158	BNBTO-0158	BOLD:AAY7422	KY947460		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO158	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho				-22.153597	-57.543536							
BNBTO-0168	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Trameinae	Tramea	Tramea abdominalis		Marciel Elio Rodrigues Rodrigues	Not determinated	Larvae	BNBTO168-11	BNBTO-0168	BNBTO-0168	BOLD:AAY5969	KY947461		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO168	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho				-22.153597	-57.543536							
BNBTO-0169	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Trameinae	Pantala	Pantala flavescens		Marciel Elio Rodrigues Rodrigues	Not determinated	Larvae	BNBTO169-11	BNBTO-0169	BNBTO-0169	BOLD:AAH6890	KY947462		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO169	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho				-22.153597	-57.543536							
BNBTO-0170	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Trameinae	Pantala	Pantala flavescens		Marciel Elio Rodrigues Rodrigues	Not determinated	Larvae	BNBTO170-11	BNBTO-0170	BNBTO-0170	BOLD:AAH6890	KY947463		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO170	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho				-22.153597	-57.543536							
BNBTO-0179	Arthropoda	Insecta	Odonata	Zygoptera	Calopterygidae	Calopteryginae	Mnesarete	Mnesarete smaragdina		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO179-11	BNBTO-0179	BNBTO-0179	BOLD:AAY6023	KY947464		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO179	Marciel Elio Rodrigues	Brazil	Parana	Cascavel	Distrito Juvinopolis	Rio das Antas	-25.260694	-53.365325														
BNBTO-0180	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Argiinae	Argia	Argia chapadae		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO180-11	BNBTO-0180	BNBTO-0180	BOLD:AAY5929	KY947465		656bp	Universidade Federal de Mato Grosso do Sul	BNBTO180	Marciel Elio Rodrigues	Brazil	Parana	Cascavel	Distrito Juvinopolis	Rio das Antas	-25.260694	-53.365325														
BNBTO-0181	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Ischnurinae	Oxyagrion	Oxyagrion terminale		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO181-11	BNBTO-0181	BNBTO-0181	BOLD:AAY6021	KY947466		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO181	Marciel Elio Rodrigues	Brazil	Parana	Cascavel	Distrito Juvinopolis	Rio das Antas	-25.260694	-53.365325														
BNBTO-0182	Arthropoda	Insecta	Odonata	Zygoptera	Coenagrionidae	Ischnurinae	Oxyagrion	Oxyagrion terminale		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO182-11	BNBTO-0182	BNBTO-0182	BOLD:AAY6021	KY947467		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO182	Marciel Elio Rodrigues	Brazil	Parana	Cascavel	Distrito Juvinopolis	Rio das Antas	-25.260694	-53.365325														
BNBTO-0183	Arthropoda	Insecta	Odonata	Zygoptera	Calopterygidae	Hetaerininae	Hetaerina	Hetaerina rosea		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO183-11	BNBTO-0183	BNBTO-0183	BOLD:AAY5702	KY947468		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO183	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho		Corrego Jango Fundo	-22.082386	-57.5785														
BNBTO-0184	Arthropoda	Insecta	Odonata	Zygoptera	Calopterygidae	Hetaerininae	Hetaerina	Hetaerina rosea		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO184-11	BNBTO-0184	BNBTO-0184	BOLD:AAY5702	KY947469		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO184	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho		Corrego Jango Fundo	-22.082386	-57.5785														
BNBTO-0185	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax paraguayensis		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO185-11	BNBTO-0185	BNBTO-0185	BOLD:AAY5970	KY947470		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO185	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho				-22.153597	-57.543536							
BNBTO-0186	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax paraguayensis		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO186-11	BNBTO-0186	BNBTO-0186	BOLD:AAY5970	KY947471		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO186	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho				-22.153597	-57.543536							
BNBTO-0187	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax paraguayensis		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO187-11	BNBTO-0187	BNBTO-0187	BOLD:AAY5970	KY947472		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO187	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho				-22.153597	-57.543536							
BNBTO-0188	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax paraguayensis		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO188-11	BNBTO-0188	BNBTO-0188	BOLD:AAY5970	KY947473		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO188	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho				-22.153597	-57.543536							
BNBTO-0189	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythrodiplax	Erythrodiplax paraguayensis		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO189-11	BNBTO-0189	BNBTO-0189	BOLD:AAY5970	KY947474		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO189	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho				-22.153597	-57.543536							
BNBTO-0196	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Brachydiplacinae	Micrathyria	Micrathyria ocellata	Micrathyria ocellata dentiens	Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO196-12	BNBTO-0196	BNBTO-0196	BOLD:AAY5968	KY947475		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO196	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho	Faz. Retiro Conceicao			-21.698147	-57.75855							
BNBTO-0201	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Libellulinae	Orthemis	Orthemis cultriformis		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO201-12	BNBTO-0201	BNBTO-0201	BOLD:AAY7423	KY947476		657bp	Universidade Federal de Mato Grosso do Sul	BNBTO201	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Bonito		Corr. Cabana	-21.170578	-56.441364														
BNBTO-0202	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Libellulinae	Orthemis	Orthemis cultriformis		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO202-12	BNBTO-0202	BNBTO-0202	BOLD:AAY7423	KY947477		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO202	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Bonito		Corr. Cabana	-21.170578	-56.441364														
BNBTO-0204	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythemis	Erythemis carmelita		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO204-12	BNBTO-0204	BNBTO-0204	BOLD:ACA0824	KY947478		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO204	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho	Faz. Retiro Conceicao			-21.698147	-57.75855							
BNBTO-0205	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythemis	Erythemis carmelita		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO205-12	BNBTO-0205	BNBTO-0205	BOLD:ACA0824	KY947479		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO205	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho	Faz. Retiro Conceicao			-21.698147	-57.75855							
BNBTO-0206	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythemis	Erythemis vesiculosa		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO206-12	BNBTO-0206	BNBTO-0206	BOLD:AAY5962	KY947480		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO206	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho	Faz. Retiro Conceicao			-21.698147	-57.75855							
BNBTO-0309	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Trameinae	Pantala	Pantala flavescens		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO309-12	BNBTO-0309	BNBTO-0309	BOLD:AAH6890	KY947481		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO309	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Jardim				-21.433	-56.442							
BNBTO-0312	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Libellulinae	Elasmothemis	Elasmothemis cannacroides		Marciel Elio Rodrigues Rodrigues	Male	Adult	BNBTO312-12	BNBTO-0312	BNBTO-0312	BOLD:AAY7421	KY947482		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO312	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Bela Vista		Corrego Feio	-21.680464	-56.76431														
BNBTO-0314	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Sympetrinae	Erythemis	Erythemis peruviana		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO314-12	BNBTO-0314	BNBTO-0314	BOLD:ACA0824	KY947483		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO314	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho	Faz. Retiro Conceicao			-21.698147	-57.75855							
BNBTO-0318	Arthropoda	Insecta	Odonata	Anisoptera	Aeshnidae	Aeshninae	Gynacantha	Gynacantha sp.		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO318-12	BNBTO-0318	BNBTO-0318	BOLD:ACA3440	KY947484		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO318	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Porto Murtinho	Faz. Retiro Conceicao			-21.698147	-57.75855							
BNBTO-0332	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Trithemistinae	Dythemis	Dythemis multipunctata		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO332-12	BNBTO-0332	BNBTO-0332	BOLD:AAY5938	KY947485		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO332	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Bonito		Corrego Cabana	-21.170578	-56.441364														
BNBTO-0380	Arthropoda	Insecta	Odonata	Anisoptera	Libellulidae	Trithemistinae	Dythemis	Dythemis multipunctata		Marciel Elio Rodrigues Rodrigues	Female	Adult	BNBTO380-12	BNBTO-0380	BNBTO-0380	BOLD:AAY5938	KY947486		658bp	Universidade Federal de Mato Grosso do Sul	BNBTO380	Marciel Elio Rodrigues	Brazil	Mato Grosso do Sul	Bodoquena		Corrego Oco do Sapo	-20.700042	-56.860775														

Chapter 4

S5 Table. List of Anisoptera and Zygoptera species analyzed in this study.

S6 Table. Number of intraspecific and interspecific comparisons in Anisoptera grouped following the pairwise percentage divergence. The continuity of distance values evidence no clear barcode gap.

S7 Table. Number of intraspecific and interspecific comparisons in Zygoptera grouped following the pairwise percentage divergence. The continuity of distance values evidence no clear barcode gap.

S8 Table. List of species which showed intraspecific comparison values above 2% or interspecific comparison values below 2%. x, species which presented interspecific comparisons values below the threshold with species of another genus.

S9 Table. List of species which showed intraspecific comparison values above 3% or interspecific comparison values below 3%. x, species which presented interspecific comparisons values below the threshold with species of another genus.

S5 Table. List of Anisoptera and Zygoptera species analyzed in this study.

Anisoptera		Zygoptera	
Acisoma	*ascalaphoides*	*Acanthagrion*	*phallicorne*
Acisoma	*attenboroughi*	*Acanthagrion*	*rubrifrons*
Acisoma	*inflatum*	*Aciagrion*	*bapepe*
Acisoma	*panorpoides*	*Aciagrion*	*borneense*
Acisoma	*trifidum*	*Aciagrion*	*brosseti*
Acisoma	*variegatum*	*Aciagrion*	*migratum*
Aeschnophlebia	*anisoptera*	*Aciagrion*	*occidentale*
Aeschnophlebia	*longistigma*	*Aciagrion*	*olympicum*
Aeshna	*affinis*	*Aeolagrion*	*dorsale*
Aeshna	*canadensis*	*Africallagma*	*elongatum*
Aeshna	*constricta*	*Africallagma*	*quingentum*
Aeshna	*crenata*	*Africallagma*	*vaginale*
Aeshna	*cyanea*	*Africocypha*	*centripunctata*
Aeshna	*eremita*	*Africocypha*	*lacuselephantum*
Aeshna	*grandis*	*Africocypha*	*varicolor*
Aeshna	*interrupta*	*Agriocnemis*	*canuango*
Aeshna	*juncea*	*Agriocnemis*	*femina*
Aeshna	*mixta*	*Agriocnemis*	*forcipata*
Aeshna	*rileyi*	*Agriocnemis*	*keralensis*
Aeshna	*septentrionalis*	*Agriocnemis*	*minima*
Aeshna	*serrata*	*Agriocnemis*	*pygmaea*
Aeshna	*sitchensis*	*Agriocnemis*	*toto*
Aeshna	*subarctica*	*Agriomorpha*	*fusca*
Aeshna	*subpupillata*	*Allocnemis*	*cyanura*
Aeshna	*tuberculifera*	*Allocnemis*	*leucosticta*
Aeshna	*umbrosa*	*Allocnemis*	*nigripes*
Aeshna	*vercanica*	*Allocnemis*	*vicki*
Aeshna	*viridis*	*Amanipodagrion*	*gilliesi*
Aethriamanta	*brevipennis*	*Amazoneura*	*ephippigera*
Agrionoptera	*insignis*	*Amphiagrion*	*abbreviatum*
Agrionoptera	*sanguinolenta*	*Amphicnemis*	*ecornuta*
Allorrhizucha	*preussi*	*Amphipteryx*	*agrioides*
Anaciaeschna	*jaspidea*	*Anisopleura*	*furcata*
Anaciaeschna	*martini*	*Anisopleura*	*qingyuanensis*
Anaciaeschna	*triangulifera*	*Anomisma*	*abnorme*
Anax	*congoliath*	*Arabicnemis*	*caerulea*
Anax	*ephippiger*	*Archaeopodagrion*	*armatum*
Anax	*gladiator*	*Archiargiolestes*	*parvulus*
Anax	*guttatus*	*Archiargiolestes*	*pusillissimus*
Anax	*imperator*	*Archibasis*	*melanocyana*
Anax	*junius*	*Argia*	*moesta*
Anax	*nigrofasciatus*	*Argia*	*oculata*
Anax	*panybeus*	*Argiocnemis*	*rubescens*
Anax	*parthenope*	*Argiolestes*	*amphistylus*
Anax	*rutherfordi*	*Argiolestes*	*muller*
Anax	*speratus*	*Argiolestes*	*roon*
Anax	*tristis*	*Argiolestes*	*tuberculiferus*

Anectothemis apicalis
Anisogomphus maacki
Anotogaster chaoi
Anotogaster klossi
Anotogaster kuchenbeiseri
Anotogaster sieboldii
Aphylla angustifolia
Aphylla protracta
Aphylla williamsoni
Arigomphus cornutus
Arigomphus furcifer
Arigomphus lentulus
Arigomphus maxwelli
Arigomphus pallidus
Arigomphus submedianus
Arigomphus villosipes
Asiagomphus amamiensis
Asiagomphus coreanus
Asiagomphus hainanensis
Asiagomphus melaenops
Asiagomphus pryeri
Asiagomphus septimus
Asiagomphus xanthenatus
Asiagomphus yayeyamensis
Austrogomphus guerini
Basiaeschna janata
Boninthemis insularis
Boyeria grafiana
Boyeria maclachlani
Brachydiplax chalybea
Brachydiplax sobrina
Brachythemis contaminata
Brachytron pratense
Bradinopyga geminata
Brechmorhoga mendax
Burmagomphus arboreus
Burmagomphus collaris
Burmagomphus divaricatus
Burmagomphus gratiosus
Burmagomphus sowerbyi
Celithemis elisa
Chalcostephia flavifrons
Chlorogomphus brunneus
Chlorogomphus iriomotensis
Chlorogomphus okinawensis
Congothemis longistyla
Cordulegaster bidentata
Cordulegaster boltonii
Cordulegaster helladica
Cordulegaster heros
Aristocypha fenestrella
Aristocypha iridea
Arrhenocnemis amphidactylis
Arrhenocnemis parvibullis
Atrocalopteryx atrata
Austroagrion watsoni
Austroargiolestes alpinus
Austroargiolestes calcaris
Austroargiolestes christine
Austroargiolestes chrysoides
Austroargiolestes icteromelas
Austrocoenagrion lyelli
Austrolestes analis
Austrolestes leda
Austrolestes minjerriba
Azuragrion buchholzi
Bayadera brevicauda
Bayadera ishigakiana
Bromeliagrion rehni
Burmargiolestes laidlawi
Burmargiolestes melanothorax
Caledopteryx sarasini
Calicnemia chaseni
Calicnemia rectangulata
Calicnemia sinensis
Caliphaea confusa
Calopteryx cornelia
Calopteryx japonica
Calopteryx maculata
Cercion hieroglyphicum
Ceriagrion auranticum
Ceriagrion bakeri
Ceriagrion banditum
Ceriagrion cerinorubellum
Ceriagrion chaoi
Ceriagrion corallinum
Ceriagrion coromandelianum
Ceriagrion fallax
Ceriagrion glabrum
Ceriagrion junceum
Ceriagrion katamborae
Ceriagrion kordofanicum
Ceriagrion melanurum
Ceriagrion nipponicum
Ceriagrion obfuscans
Ceriagrion olivaceum
Ceriagrion sakejii
Ceriagrion suave
Ceriagrion tenellum
Ceriagrion whellani

Cordulegaster insignis
Cordulegaster maculata
Cordulegaster picta
Cordulegaster princeps
Cordulegaster trinacriae
Cordulephya pygmaea
Cordulia aenea
Cordulia amurensis
Cratilla lineata
Cratilla metallica
Crenigomphus hartmanni
Crenigomphus renei
Crocothemis erythraea
Crocothemis sanguinolenta
Crocothemis servilia
Davidius bicornutus
Davidius fruhstorferi
Davidius fujiama
Davidius lunatus
Davidius moiwanus
Davidius nanus
Deielia phaon
Diplacodes bipunctata
Diplacodes nebulosa
Diplacodes trivialis
Dorocordulia libera
Dromogomphus armatus
Dromogomphus spinosus
Dromogomphus spoliatus
Eleuthemis buettikoferi
Eleuthemis eogaster
Eleuthemis libera
Eleuthemis umbrina
Epitheca bimaculata
Epitheca marginata
Epophthalmia elegans
Epophthalmia vittigera
Erpetogomphus compositus
Erpetogomphus designatus
Erpetogomphus eutainia
Erpetogomphus heterodon
Erpetogomphus lampropeltis
Erythemis simplicicollis
Gomphidia abbotti
Gomphidia confluens
Gomphus abbreviatus
Gomphus adelphus
Gomphus apomyius
Gomphus australis
Gomphus borealis
Ceylonosticta adami
Ceylonosticta anamia
Ceylonosticta austeni
Ceylonosticta bine
Ceylonosticta brincki
Ceylonosticta digna
Ceylonosticta hilaris
Ceylonosticta inferioreducta
Ceylonosticta lankanensis
Ceylonosticta mirifica
Ceylonosticta mojca
Ceylonosticta montana
Ceylonosticta nietneri
Ceylonosticta submontana
Ceylonosticta tropica
Ceylonosticta venusta
Ceylonosticta walli
Chalcopteryx seabrai
Chlorocnemis abbotti
Chlorocypha aurora
Chlorocypha cancellata
Chlorocypha flammea
Chlorocypha maxima
Chromagrion conditum
Coeliccia albicauda
Coeliccia borneensis
Coeliccia cyaneothorax
Coeliccia cyanomelas
Coeliccia didyma
Coeliccia flavicauda
Coeliccia flavostriata
Coeliccia nemoricola
Coeliccia octogesima
Coeliccia poungyi
Coeliccia ryukyuensis
Coenagriocnemis insulare
Coenagriocnemis rufipes
Coenagrion angulatum
Coenagrion caerulescens
Coenagrion ecornutum
Coenagrion hylas
Coenagrion interrogatum
Coenagrion johanssoni
Coenagrion lanceolatum
Coenagrion mercuriale
Coenagrion puella
Coenagrion pulchellum
Coenagrion resolutum
Coenagrion terue
Copera annulata

Gomphus *cavillaris*
Gomphus *consanguis*
Gomphus *crassus*
Gomphus *descriptus*
Gomphus *diminutus*
Gomphus *exilis*
Gomphus *externus*
Gomphus *flavipes*
Gomphus *fraternus*
Gomphus *geminatus*
Gomphus *graslinellus*
Gomphus *hodgesi*
Gomphus *hybridus*
Gomphus *kurilis*
Gomphus *lineatifrons*
Gomphus *lividus*
Gomphus *lynnae*
Gomphus *militaris*
Gomphus *minutus*
Gomphus *modestus*
Gomphus *ozarkensis*
Gomphus *parvidens*
Gomphus *pulchellus*
Gomphus *quadricolor*
Gomphus *rogersi*
Gomphus *sandrius*
Gomphus *septima*
Gomphus *simillimus*
Gomphus *spicatus*
Gomphus *vastus*
Gomphus *ventricosus*
Gomphus *viridifrons*
Gomphus *vulgatissimus*
Gomphus *westfalli*
Gynacantha *africana*
Gynacantha *bispina*
Gynacantha *bullata*
Gynacantha *congolica*
Gynacantha *japonica*
Gynacantha *manderica*
Gynacantha *nigeriensis*
Gynacantha *pupillata*
Gynacantha *ryukyuensis*
Gynacantha *usambarica*
Gynacantha *vesiculata*
Gynacantha *villosa*
Hadrothemis *infesta*
Hagenius *brevistylus*
Heliogomphus *selysi*
Helocordulia *uhleri*
Copera *marginipes*
Copera *nyansana*
Copera *sikassoensis*
Copera *tokyoensis*
Coryphagrion *grandis*
Cryptophaea *vietnamensis*
Cyanocnemis *aureofrons*
Cyrano *angustior*
Devadatta *aran*
Devadatta *argyoides*
Devadatta *basilanensis*
Devadatta *clavicauda*
Devadatta *cyanocephala*
Devadatta *podolestoides*
Devadatta *somoh*
Devadatta *tanduk*
Dimeragrion *percubitale*
Diphlebia *coerulescens*
Diphlebia *hybridoides*
Dolonagrion *fulvellum*
Drepanoneura *muzoni*
Drepanosticta *actaeon*
Drepanosticta *attala*
Drepanosticta *barbatula*
Drepanosticta *carmichaeli*
Drepanosticta *clavata*
Drepanosticta *dentifera*
Drepanosticta *dulitensis*
Drepanosticta *krios*
Drepanosticta *lestoides*
Drepanosticta *mylitta*
Drepanosticta *quadrata*
Drepanosticta *rufostigma*
Drepanosticta *versicolor*
Dysphaea *basitincta*
Dysphaea *dimidiata*
Dysphaea *gloriosa*
Dysphaea *ulu*
Dysphaea *vanida*
Echo *modesta*
Elattoneura *aurantiaca*
Elattoneura *aurifex*
Elattoneura *centrafricana*
Elattoneura *frenulata*
Elattoneura *glauca*
Elattoneura *josemorai*
Elattoneura *lapidaria*
Elattoneura *lliba*
Elattoneura *nigra*
Elattoneura *tarbotonorum*

Hemicordulia *mindana*
Hemicordulia *ogasawarensis*
Hemicordulia *okinawensis*
Hemicordulia *tenera*
Hemigomphus *heteroclytus*
Hydrobasileus *croceus*
Ictinogomphus *decoratus*
Ictinogomphus *pertinax*
Ictinogomphus *rapax*
Idionyx *selysi*
Kalyptogaster *erronea*
Ladona *deplanata*
Ladona *depressa*
Ladona *exusta*
Ladona *fulva*
Ladona *julia*
Lamelligomphus *ringens*
Lanthus *fujiacus*
Lanthus *parvulus*
Lanthus *vernalis*
Lathrecista *asiatica*
Leptogomphus *gestroi*
Leptogomphus *yayeyamensis*
Lestinogomphus *angustus*
Lestinogomphus *calcaratus*
Lestinogomphus *congoensis*
Lestinogomphus *matilei*
Lestinogomphus *nefrens*
Lestinogomphus *obtusus*
Leucorrhinia *dubia*
Leucorrhinia *frigida*
Leucorrhinia *glacialis*
Leucorrhinia *hudsonica*
Leucorrhinia *intacta*
Leucorrhinia *intermedia*
Leucorrhinia *patricia*
Leucorrhinia *pectoralis*
Leucorrhinia *proxima*
Libellula *angelina*
Libellula *auripennis*
Libellula *axilena*
Libellula *comanche*
Libellula *composita*
Libellula *croceipennis*
Libellula *cyanea*
Libellula *flavida*
Libellula *forensis*
Libellula *incesta*
Libellula *jesseana*
Libellula *luctuosa*
Elattoneura *tenax*
Elattoneura *tropicalis*
Elattoneura *vittata*
Enallagma *annexum*
Enallagma *antennatum*
Enallagma *boreale*
Enallagma *circulatum*
Enallagma *civile*
Enallagma *clausum*
Enallagma *cyathigerum*
Enallagma *divagans*
Enallagma *doubledayi*
Enallagma *ebrium*
Enallagma *exsulans*
Enallagma *geminatum*
Enallagma *hageni*
Enallagma *signatum*
Enallagma *vesperum*
Eoargiolestes *ochraceus*
Epipleoneura *lamina*
Erythromma *humerale*
Erythromma *najas*
Esme *longistyla*
Esme *mudiensis*
Euphaea *decorata*
Euphaea *formosa*
Euphaea *fraseri*
Euphaea *impar*
Euphaea *superba*
Euphaea *yayeyamana*
Griseargiolestes *bucki*
Griseargiolestes *eboracus*
Griseargiolestes *griseus*
Heliocharis *amazona*
Heliocypha *fenestrata*
Hetaerina *americana*
Hetaerina *cruentata*
Hetaerina *laesa*
Hetaerina *sanguinea*
Hetaerina *sempronia*
Hetaerina *vulnerata*
Heteragrion *bickorum*
Heteragrion *chrysops*
Heteragrion *inca*
Heteropodagrion *sanguinipes*
Idiocnemis *louisiadensis*
Idiocnemis *obliterata*
Igneocnemis *flammea*
Indocnemis *ambigua*
Indocnemis *orang*

Libellula needhami
Libellula nodistica
Libellula pulchella
Libellula quadrimaculata
Libellula saturata
Libellula semifasciata
Libellula vibrans
Lindenia tetraphylla
Lyriothemis elegantissima
Lyriothemis flava
Lyriothemis pachygastra
Macrodiplax cora
Macromia amphigena
Macromia callisto
Macromia chaiyaphumensis
Macromia clio
Macromia cupricincta
Macromia daimoji
Macromia gerstaeckeri
Macromia illinoiensis
Macromia kubokaiya
Macromia manchurica
Macromia urania
Macromia westwoodii
Macromidia ishidai
Malgassophlebia andzaba
Malgassophlebia bispina
Malgassophlebia westfalli
Melligomphus ardens
Merogomphus pavici
Micromacromia camerunica
Nannophya pygmaea
Neallogaster pekinensis
Neodythemis infra
Neodythemis katanga
Neopetalia punctata
Nesciothemis farinosa
Neurogomphus cocytius
Neurothemis fluctuans
Neurothemis fulvia
Neurothemis ramburii
Neurothemis terminata
Nihonogomphus lieftincki
Nihonogomphus minor
Nihonogomphus ruptus
Nihonogomphus semanticus
Nihonogomphus thomassoni
Nihonogomphus viridis
Notogomphus bosumbuli
Notogomphus cobyae
Indocypha catopta
Indolestes boninensis
Indolestes cyaneus
Indolestes peregrinus
Indosticta deccanensis
Inpabasis hubelli
Inpabasis rosea
Ischnura asiatica
Ischnura aurora
Ischnura elegans
Ischnura ezoin
Ischnura fluviatilis
Ischnura forcipata
Ischnura graellsii
Ischnura heterosticta
Ischnura kellicotti
Ischnura posita
Ischnura rufostigma
Ischnura senegalensis
Ischnura verticalis
Isosticta gracilior
Leptagrion elongatum
Lestes congener
Lestes disjunctus
Lestes dissimulans
Lestes dryas
Lestes elatus
Lestes helix
Lestes japonicus
Lestes pallidus
Lestes pinheyi
Lestes praemorsus
Lestes rectangularis
Lestes sponsa
Lestes temporalis
Lestes unguiculatus
Lestes virens
Libellago aurantiaca
Libellago celebensis
Libellago hyalina
Lochmaeocnemis malacodora
Luzonargiolestes baltazarae
Matrona basilaris
Matrona cyanoptera
Matticnemis doi
Mecistogaster asticta
Mecistogaster linearis
Mecistogaster lucretia
Mecistogaster martinezi
Melanesobasis corniculata

Notogomphus intermedius
Notogomphus kimpavita
Notogomphus praetorius
Nychogomphus duaricus
Octogomphus specularis
Onychogomphus forcipatus
Onychogomphus malabarensis
Onychogomphus risi
Onychogomphus serrulatus
Onychogomphus uncatus
Onychogomphus undecim
Onychogomphus viridicostus
Ophiogomphus acuminatus
Ophiogomphus anomalus
Ophiogomphus arizonicus
Ophiogomphus aspersus
Ophiogomphus australis
Ophiogomphus bison
Ophiogomphus carolus
Ophiogomphus cecilia
Ophiogomphus colubrinus
Ophiogomphus edmundo
Ophiogomphus howei
Ophiogomphus incurvatus
Ophiogomphus mainensis
Ophiogomphus morrisoni
Ophiogomphus occidentis
Ophiogomphus rupinsulensis
Ophiogomphus severus
Ophiogomphus smithi
Ophiogomphus susbehcha
Ophiogomphus westfalli
Orthemis ferruginea
Orthemis schmidti
Orthetrum agaricum
Orthetrum albistylum
Orthetrum austeni
Orthetrum borneense
Orthetrum brachiale
Orthetrum chrysis
Orthetrum chrysostigma
Orthetrum coerulescens
Orthetrum glaucum
Orthetrum hintzi
Orthetrum internum
Orthetrum japonicum
Orthetrum julia
Orthetrum kafwi
Orthetrum lineostigma
Orthetrum lusinga
Melanesobasis maculosa
Melanesobasis mcleani
Melanesobasis simmondsi
Mesocnemis robusta
Mesocnemis singularis
Mesoleptobasis cantralli
Mesoleptobasis elongata
Mesopodagrion tibetanum
Metacnemis valida
Metagrion fornicatum
Metagrion sponsum
Metaleptobasis mauritia
Metaleptobasis minteri
Miniargiolestes minimus
Mnais andersoni
Mnais costalis
Mnais mneme
Mnais pruinosa
Mnais yunosukei
Mnesarete cupraea
Mnesarete fulgida
Mortonagrion hirosei
Mortonagrion martini
Mortonagrion selenion
Mortonagrion stygium
Nehalennia irene
Nehalennia speciosa
Neoneura fulvicollis
Neoneura rurriventris
Neosticta canescens
Nesobasis angulicollis
Nesobasis brachycerca
Nesobasis caerulecaudata
Nesobasis campioni
Nesobasis comosa
Nesobasis erythrops
Nesobasis flavifrons
Nesobasis heteroneura
Nesobasis longistyla
Nesobasis malcolmi
Nesobasis rufostigma
Nesobasis selysi
Nesobasis telegastrum
Neurobasis ianthinipennis
Neurobasis longipes
Neurolestes trinervis
Nosoticta erythrura
Nosoticta solitaria
Nubiolestes diotima
Onychargia atrocyana

Orthetrum luzonicum
Orthetrum melania
Orthetrum poecilops
Orthetrum pruinosum
Orthetrum sabina
Orthetrum saegeri
Orthetrum testaceum
Orthetrum triangulare
Orthetrum trinacria
Orthetrum umbratum
Pachydiplax longipennis
Palpopleura sexmaculata
Pantala flavescens
Paragomphus abnormis
Paragomphus alluaudi
Paragomphus capricornis
Paragomphus clausnitzerorum
Paragomphus cognatus
Paragomphus darwalli
Paragomphus dispar
Paragomphus elpidius
Paragomphus fritillarius
Paragomphus genei
Paragomphus kiautai
Paragomphus lemperti
Paragomphus machadoi
Paragomphus nigroviridis
Paragomphus tournieri
Paragomphus viridior
Phyllogomphoides stigmatus
Phyllogomphus bongorum
Phyllopetalia apicalis
Planaeschna ishigakiana
Planaeschna milnei
Planaeschna risi
Planaeschna taiwana
Plathemis lydia
Plathemis subornata
Polycanthagyna melanictera
Porpacithemis dubia
Porpacithemis leakeyi
Porpax asperipes
Porpax mezierei
Potamarcha obscura
Progomphus bellei
Progomphus borealis
Progomphus obscurus
Pseudothemis zonata
Rhionaeschna cornigera
Rhionaeschna diffinis
Oxyagrion terminale
Pachycypha aurea
Palaemnema brevignoni
Palaemnema domina
Palaiargia charmosyna
Papuagrion marijanmatoki
Papuagrion occipitale
Papuagrion prothoracale
Paracercion calamorum
Paracercion hieroglyphicum
Paracercion melanotum
Paracercion plagiosum
Paracercion sieboldii
Paracercion v-nigrum
Paracnemis alluaudi
Paramecocnemis erythrostigma
Paramecocnemis stillacruoris
Paraphlebia quinta
Paraphlebia zoe
Pentaphlebia mangana
Pentaphlebia stahli
Pericnemis lestoides
Perilestes kahli
Perilestes solutus
Perissolestes guianensis
Phaon camerunensis
Philoganga vetusta
Philogenia cassandra
Philogenia ferox
Philogenia iquita
Philosina alba
Philosina buchi
Phoenicagrion flammeum
Platycnemis acutipennis
Platycnemis echigoana
Platycnemis foliacea
Platycnemis pennipes
Platycypha caligata
Platycypha picta
Platysticta apicalis
Platysticta greeni
Platysticta maculata
Platysticta secreta
Platysticta serendibica
Podolestes buwaldai
Podolestes harrissoni
Podolestes orientalis
Podopteryx selysi
Polythore aurora
Prodasineura dorsalis

Rhionaeschna galapagoensis
Rhionaeschna marchali
Rhodothemis rufa
Rhyothemis fuliginosa
Rhyothemis phyllis
Rhyothemis severini
Rhyothemis variegata
Sarasaeschna kunigamiensis
Sarasaeschna lieni
Sarasaeschna pryeri
Shaogomphus postocularis
Sieboldius albardae
Sieboldius nigricolor
Sinictinogomphus clavatus
Sinogomphus flavolimbatus
Sinorogomphus suzukii
Somatochlora alpestris
Somatochlora arctica
Somatochlora clavata
Somatochlora dido
Somatochlora elongata
Somatochlora exuberata
Somatochlora franklini
Somatochlora graeseri
Somatochlora metallica
Somatochlora minor
Somatochlora semicircularis
Somatochlora uchidai
Somatochlora viridiaenea
Somatochlora williamsoni
Stylogomphus albistylus
Stylogomphus ryukyuanus
Stylogomphus shirozui
Stylogomphus sigmastylus
Stylogomphus suzukii
Stylurus amnicola
Stylurus annulatus
Stylurus intricatus
Stylurus ivae
Stylurus laurae
Stylurus nagoyanus
Stylurus notatus
Stylurus oculatus
Stylurus olivaceus
Stylurus plagiatus
Stylurus scudderi
Stylurus spiniceps
Stylurus townesi
Sympetrum ambiguum
Sympetrum baccha
Prodasineura sita
Prodasineura vittata
Proplatycnemis hova
Proplatycnemis pembipes
Proplatycnemis sanguinipes
Protolestes fickei
Protolestes kerckhoffae
Protoneura paucinervis
Protosticta grandis
Protosticta linnaei
Protosticta plicata
Protosticta satoi
Pseudagrion acaciae
Pseudagrion aureolum
Pseudagrion australasiae
Pseudagrion bicoerulans
Pseudagrion dactylidium
Pseudagrion hamoni
Pseudagrion ignifer
Pseudagrion kersteni
Pseudagrion massaicum
Pseudagrion microcephalum
Pseudagrion munte
Pseudagrion niloticum
Pseudagrion pacale
Pseudagrion pilidorsum
Pseudagrion sarepi
Pseudagrion spencei
Pseudagrion tanganyicum
Pseudocopera ciliata
Pseudolestes mirabilis
Psolodesmus mandarinus
Pyrrhargiolestes angulatus
Pyrrhargiolestes aulicus
Pyrrhargiolestes sidonia
Pyrrhosoma elisabethae
Pyrrhosoma latiloba
Pyrrhosoma nymphula
Pyrrhosoma tinctipenne
Rhinagrion borneense
Rhinagrion mima
Rhinocypha bisignata
Rhinocypha chaoi
Rhinocypha ogasawarensis
Rhinocypha pagenstecheri
Rhinocypha spinifer
Rhinocypha tincta
Rhinocypha uenoi
Rhinoneura caerulea
Rhipidolestes aculeatus

Sympetrum cordulegaster
Sympetrum corruptum
Sympetrum costiferum
Sympetrum croceolum
Sympetrum danae
Sympetrum darwinianum
Sympetrum depressiusculum
Sympetrum eroticum
Sympetrum flaveolum
Sympetrum fonscolombii
Sympetrum frequens
Sympetrum gracile
Sympetrum infuscatum
Sympetrum internum
Sympetrum janeae
Sympetrum kunckeli
Sympetrum maculatum
Sympetrum madidum
Sympetrum meridionale
Sympetrum nigrescens
Sympetrum obtrusum
Sympetrum occidentale
Sympetrum pallipes
Sympetrum parvulum
Sympetrum pedemontanum
Sympetrum risi
Sympetrum rubicundulum
Sympetrum sanguineum
Sympetrum semicinctum
Sympetrum signiferum
Sympetrum speciosum
Sympetrum striolatum
Sympetrum uniforme
Sympetrum vicinum
Sympetrum vulgatum
Syncordulia gracilis
Syncordulia legator
Syncordulia serendipator
Syncordulia venator
Synthemis eustalacta
Tachopteryx thoreyi
Tanypteryx pryeri
Tetracanthagyna plagiata
Tetragoneuria canis
Tetragoneuria cynosura
Tetrathemis irregularis
Thermorthemis madagascariensis
Tholymis tillarga
Tragogomphus grogonfla
Tramea basilaris
Rhipidolestes amamiensis
Rhipidolestes asatoi
Rhipidolestes hiraoi
Rhipidolestes nectans
Rhipidolestes okinawanus
Rhipidolestes owadai
Rhipidolestes shozoi
Rhipidolestes yakusimensis
Rhodischnura nursei
Sapho bicolor
Sclerocypha bisignata
Selysioneura capreola
Selysioneura phasma
Sinosticta hainanense
Spesbona angusta
Stenagrion dubium
Stenocypha tenuis
Sundacypha petiolata
Sundacypha striata
Sympecma fusca
Sympecma paedisca
Synlestes selysi
Synlestes weyersii
Tatocnemis denticularis
Tatocnemis malgassica
Teinobasis alluaudi
Teinobasis cryptica
Teinobasis laidlawi
Teinobasis rajah
Teinobasis rufithorax
Teinobasis scintillans
Teinopodagrion meridionale
Teinopodagrion venale
Telebasis dunklei
Telebasis obsoleta
Telosticta bidayuh
Telosticta dayak
Telosticta dupophila
Thaumatagrion funereum
Thaumatoneura inopinata
Torrenticnemis filicornis
Trineuragrion percostale
Umma gumma
Vestalis amabilis
Vestalis apicalis
Vestalis gracilis
Vestalis smaragdina
Xanthagrion erythroneurum
Xanthocnemis zealandica
Xiphiagrion cyanomelas

Tramea	*lacerata*
Tramea	*loewii*
Tramea	*propinqua*
Tramea	*transmarina*
Tramea	*virginia*
Trigomphus	*citimus*
Trigomphus	*interruptus*
Trigomphus	*lautus*
Trigomphus	*melampus*
Trigomphus	*nigripes*
Trigomphus	*ogumai*
Trithemis	*annulata*
Trithemis	*anomala*
Trithemis	*arteriosa*
Trithemis	*aurora*
Trithemis	*donaldsoni*
Trithemis	*dorsalis*
Trithemis	*festiva*
Trithemis	*grouti*
Trithemis	*hinnula*
Trithemis	*kirbyi*
Trithemis	*legrandi*
Trithemis	*osvaldae*
Trithemis	*pallidinervis*
Trithemis	*pluvialis*
Trithemis	*stictica*
Trithemis	*tropicana*
Trithemis	*werneri*
Uropetala	*carovei*
Urothemis	*venata*
Zygonyx	*annika*
Zygonyx	*denticulatus*
Zygonyx	*dionyx*
Zygonyx	*flavicosta*
Zygonyx	*geminunca*
Zygonyx	*regisalberti*
Zygonyx	*torridus*
Zyxomma	*obtusum*
Zyxomma	*petiolatum*

S6 Table. Number of intraspecific and interspecific comparisons in Anisoptera grouped following the pairwise percentage divergence. The continuity of distance values evidence no clear barcode gap.

%	Interspecific comparisons	Intraspecific comparisons
0	15207	988
0.5	9175	1241
1	4958	1053
1.5	3000	3047
2	1404	2398
2.5	566	2363
3	209	1063
3.5	784	1707
4	1031	1286
4.5	280	1394
5	218	2297
5.5	315	4039
6	1744	5662
6.5	1502	6282
7	196	6055
7.5	121	5452
8	83	5468
8.5	48	6746
9	63	9482
9.5	120	10318
10	25	13179
10.5	50	17055
11	102	19548
11.5	140	17926
12	460	23108
12.5	35	32916
13	72	39429
13.5	0	55817
14	1	88806
14.5	2	151381
15	9	204179
15.5	29	270798
16	2	311456
16.5	4	368699
17	2	384518
17.5	9	412249
18	1	396904
18.5	8	340724
19	19	302297
19.5	24	243258
20	2	179355
20.5	0	135532
21	0	99895
21.5	0	66555
22	0	38930

22.5	0	21252
23	0	13394
23.5	1	6318
24	0	3518
24.5	0	1379
25	0	644
25.5	0	464
26	0	213
26.5	0	97
27	0	74
27.5	0	18
28	0	14
28.5	0	4
29	0	1
29.5	0	6
30	0	8
30.5	0	0
31	0	0
31.5	0	0
32	0	0
32.5	0	0
33	0	0
33.5	0	0
34	0	0
34.5	0	0
35	0	0
35.5	0	0
36	0	0
36.5	0	0
37	0	0
37.5	0	0
38	0	0
38.5	0	0
39	0	0
39.5	0	0
40	0	0

S7 Table. Number of intraspecific and interspecific comparisons in Zygoptera grouped following the pairwise percentage divergence. The continuity of distance values evidence no clear barcode gap.

%	Interspecific comparisons	Intraspecific comparisons
0	33496	383
0.5	39992	2582
1	9810	996
1.5	3124	1971
2	922	1109
2.5	1517	417
3	404	374
3.5	149	550
4	122	879
4.5	193	935
5	145	618
5.5	109	578
6	439	441
6.5	123	480
7	58	625
7.5	140	1409
8	163	4947
8.5	230	2948
9	178	1911
9.5	122	3388
10	123	5504
10.5	48	6770
11	98	7387
11.5	11	8629
12	0	16247
12.5	0	45747
13	0	35098
13.5	15	54683
14	0	49011
14.5	0	53601
15	0	72533
15.5	1	93967
16	2	158670
16.5	16	201333
17	1	218499
17.5	4	263141
18	0	256683
18.5	0	238765
19	0	244099
19.5	0	215673
20	0	193292
20.5	2	149149
21	4	113477
21.5	6	95201

22	6	60196
22.5	0	33995
23	0	20226
23.5	0	14568
24	0	9517
24.5	0	4984
25	0	1984
25.5	0	965
26	0	452
26.5	0	487
27	0	107
27.5	0	180
28	0	135
28.5	0	245
29	0	218
29.5	0	209
30	0	239
30.5	0	257
31	0	305
31.5	0	317
32	0	204
32.5	0	152
33	0	28
33.5	0	58
34	0	12
34.5	0	6
35	0	4
35.5	0	3
36	0	0
36.5	0	0
37	0	0
37.5	0	0
38	0	0
38.5	0	0
39	0	0
39.5	0	0
40	0	0

S8 Table. List of species which showed intraspecific comparison values above 2% or interspecific comparison values below 2%. x, species which presented interspecific comparisons values below the threshold with species of another genus.

Anisoptera				
Intraspecific comparisons above 2%		Interspecific comparison below 2%		
Acisoma	*inflatum*	*Acisoma*	*inflatum*	
Acisoma	*panorpoides*	*Acisoma*	*variegatum*	
Acisoma	*trifidum*	*Aeshna*	*constricta*	
Aeshna	*constricta*	*Aeshna*	*eremita*	
Aeshna	*crenata*	*Aeshna*	*interrupta*	
Aeshna	*cyanea*	*Aeshna*	*juncea*	
Aeshna	*juncea*	*Aeshna*	*rileyi*	
Aeshna	*mixta*	*Aeshna*	*subarctica*	
Aeshna	*subarctica*	*Aeshna*	*subpupillata*	
Aeshna	*umbrosa*	*Aeshna*	*umbrosa*	
Aethriamanta	*brevipennis*	*Allorrhizucha*	*preussi*	*x*
Agrionoptera	*insignis*	*Anaciaeschna*	*jaspidea*	*x*
Anaciaeschna	*jaspidea*	*Anax*	*imperator*	
Anax	*congoliath*	*Anax*	*nigrofasciatus*	
Anax	*nigrofasciatus*	*Anax*	*parthenope*	
Anax	*parthenope*	*Anectothemis*	*apicalis*	
Anotogaster	*chaoi*	*Aphylla*	*angustifolia*	
Anotogaster	*klossi*	*Aphylla*	*protracta*	
Anotogaster	*sieboldii*	*Arigomphus*	*cornutus*	
Asiagomphus	*amamiensis*	*Arigomphus*	*furcifer*	
Boyeria	*grafiana*	*Arigomphus*	*lentulus*	
Brachydiplax	*chalybea*	*Arigomphus*	*pallidus*	
Brachydiplax	*sobrina*	*Arigomphus*	*villosipes*	
Brachythemis	*contaminata*	*Boyeria*	*grafiana*	*x*
Bradinopyga	*geminata*	*Brachydiplax*	*chalybea*	
Chlorogomphus	*brunneus*	*Brachydiplax*	*sobrina*	
Cordulegaster	*boltonii*	*Burmagomphus*	*arboreus*	
Cordulegaster	*helladica*	*Burmagomphus*	*collaris*	
Crocothemis	*sanguinolenta*	*Burmagomphus*	*divaricatus*	
Crocothemis	*servilia*	*Burmagomphus*	*sowerbyi*	
Davidius	*moiwanus*	*Congothemis*	*longistyla*	*x*
Davidius	*nanus*	*Crocothemis*	*servilia*	*x*
Eleuthemis	*buettikoferi*	*Davidius*	*moiwanus*	
Erythemis	*simplicicollis*	*Davidius*	*nanus*	
Gomphus	*abbreviatus*	*Epophthalmia*	*elegans*	*x*
Gomphus	*graslinellus*	*Erpetogomphus*	*heterodon*	
Gomphus	*pulchellus*	*Erpetogomphus*	*lampropeltis*	
Gomphus	*spicatus*	*Gomphus*	*abbreviatus*	
Gynacantha	*bullata*	*Gomphus*	*adelphus*	
Gynacantha	*nigeriensis*	*Gomphus*	*apomyius*	
Hagenius	*brevistylus*	*Gomphus*	*borealis*	
Ictinogomphus	*decoratus*	*Gomphus*	*consanguis*	
Ladona	*julia*	*Gomphus*	*crassus*	
Lanthus	*parvulus*	*Gomphus*	*descriptus*	

Libellula	*quadrimaculata*	*Gomphus*	*diminutus*	
Macromia	*illinoiensis*	*Gomphus*	*exilis*	
Nannophya	*pygmaea*	*Gomphus*	*externus*	
Neallogaster	*pekinensis*	*Gomphus*	*fraternus*	
Neurothemis	*fluctuans*	*Gomphus*	*geminatus*	
Onychogomphus	*forcipatus*	*Gomphus*	*graslinellus*	
Ophiogomphus	*mainensis*	*Gomphus*	*hodgesi*	
Orthetrum	*japonicum*	*Gomphus*	*hybridus*	
Orthetrum	*luzonicum*	*Gomphus*	*lineatifrons*	
Orthetrum	*melania*	*Gomphus*	*lividus*	
Orthetrum	*pruinosum*	*Gomphus*	*lynnae*	
Orthetrum	*sabina*	*Gomphus*	*militaris*	
Orthetrum	*saegeri*	*Gomphus*	*minutus*	
Orthetrum	*triangulare*	*Gomphus*	*modestus*	
Pantala	*flavescens*	*Gomphus*	*ozarkensis*	
Paragomphus	*abnormis*	*Gomphus*	*parvidens*	
Paragomphus	*clausnitzerorum*	*Gomphus*	*pulchellus*	*x*
Paragomphus	*cognatus*	*Gomphus*	*quadricolor*	
Paragomphus	*darwalli*	*Gomphus*	*rogersi*	
Paragomphus	*machadoi*	*Gomphus*	*sandrius*	
Paragomphus	*nigroviridis*	*Gomphus*	*septima*	
Planaeschna	*ishigakiana*	*Gomphus*	*spicatus*	
Planaeschna	*milnei*	*Gomphus*	*vastus*	
Planaeschna	*risi*	*Gomphus*	*ventricosus*	
Progomphus	*obscurus*	*Gomphus*	*viridifrons*	
Shaogomphus	*postocularis*	*Gomphus*	*westfalli*	
Somatochlora	*alpestris*	*Gynacantha*	*congolica*	
Somatochlora	*dido*	*Gynacantha*	*manderica*	
Somatochlora	*elongata*	*Ictinogomphus*	*decoratus*	
Stylogomphus	*albistylus*	*Ictinogomphus*	*rapax*	
Stylogomphus	*ryukyuanus*	*Ladona*	*deplanata*	
Sympetrum	*baccha*	*Ladona*	*exusta*	
Sympetrum	*danae*	*Lanthus*	*parvulus*	
Sympetrum	*janeae*	*Lanthus*	*vernalis*	
Sympetrum	*meridionale*	*Leucorrhinia*	*hudsonica*	
Sympetrum	*obtrusum*	*Leucorrhinia*	*intacta*	
Sympetrum	*occidentale*	*Leucorrhinia*	*patricia*	
Sympetrum	*parvulum*	*Leucorrhinia*	*proxima*	
Sympetrum	*risi*	*Libellula*	*auripennis*	
Syncordulia	*legator*	*Libellula*	*axilena*	
Tanypteryx	*pryeri*	*Libellula*	*comanche*	
Tetragoneuria	*canis*	*Libellula*	*cyanea*	
Tramea	*transmarina*	*Libellula*	*forensis*	
Trigomphus	*citimus*	*Libellula*	*incesta*	
Trigomphus	*melampus*	*Libellula*	*jesseana*	
Trigomphus	*ogumai*	*Libellula*	*luctuosa*	
Trithemis	*aurora*	*Libellula*	*needhami*	
Trithemis	*kirbyi*	*Libellula*	*nodistica*	
Urothemis	*venata*	*Libellula*	*pulchella*	
Zygonyx	*flavicosta*	*Macromia*	*chaiyaphumensis*	

Macromia	*gerstaeckeri*	
Macromia	*illinoiensis*	*x*
Macromia	*urania*	
Neodythemis	*katanga*	*x*
Nihonogomphus	*lieftincki*	
Nihonogomphus	*thomassoni*	
Onychogomphus	*malabarensis*	*x*
Ophiogomphus	*acuminatus*	
Ophiogomphus	*anomalus*	*x*
Ophiogomphus	*arizonicus*	
Ophiogomphus	*aspersus*	
Ophiogomphus	*australis*	
Ophiogomphus	*bison*	
Ophiogomphus	*carolus*	
Ophiogomphus	*edmundo*	
Ophiogomphus	*howei*	*x*
Ophiogomphus	*incurvatus*	
Ophiogomphus	*mainensis*	*x*
Ophiogomphus	*morrisoni*	
Ophiogomphus	*occidentis*	
Ophiogomphus	*rupinsulensis*	
Ophiogomphus	*severus*	
Ophiogomphus	*smithi*	
Ophiogomphus	*susbehcha*	
Ophiogomphus	*westfalli*	
Orthemis	*ferruginea*	
Orthemis	*schmidti*	
Orthetrum	*internum*	
Orthetrum	*japonicum*	
Orthetrum	*lusinga*	
Orthetrum	*melania*	
Orthetrum	*pruinosum*	
Orthetrum	*sabina*	*x*
Orthetrum	*saegeri*	
Orthetrum	*testaceum*	
Orthetrum	*triangulare*	
Orthetrum	*umbratum*	
Paragomphus	*alluaudi*	
Paragomphus	*cognatus*	
Paragomphus	*viridior*	
Phyllopetalia	*apicalis*	*x*
Porpacithemis	*dubia*	*x*
Progomphus	*bellei*	
Progomphus	*obscurus*	
Rhyothemis	*phyllis*	*x*
Rhyothemis	*variegata*	*x*
Somatochlora	*dido*	
Somatochlora	*franklini*	
Somatochlora	*semicircularis*	
Somatochlora	*uchidai*	

		Stylogomphus	*albistylus*	*x*
		Stylogomphus	*sigmastylus*	
		Stylurus	*amnicola*	
		Stylurus	*ivae*	
		Stylurus	*nagoyanus*	
		Stylurus	*notatus*	
		Stylurus	*oculatus*	
		Stylurus	*spiniceps*	
		Stylurus	*townesi*	
		Sympetrum	*croceolum*	
		Sympetrum	*depressiusculum*	
		Sympetrum	*frequens*	
		Sympetrum	*internum*	
		Sympetrum	*janeae*	
		Sympetrum	*nigrescens*	
		Sympetrum	*obtrusum*	
		Sympetrum	*occidentale*	
		Sympetrum	*pallipes*	
		Sympetrum	*parvulum*	
		Sympetrum	*rubicundulum*	
		Sympetrum	*semicinctum*	
		Sympetrum	*signiferum*	
		Sympetrum	*striolatum*	
		Sympetrum	*uniforme*	
		Sympetrum	*vicinum*	
		Tetragoneuria	*canis*	
		Tetragoneuria	*cynosura*	
		Tramea	*loewii*	
		Tramea	*propinqua*	
		Tramea	*transmarina*	
		Tramea	*virginia*	
		Trigomphus	*citimus*	
		Trigomphus	*interruptus*	
		Trigomphus	*melampus*	
		Trigomphus	*nigripes*	
		Trigomphus	*ogumai*	
		Trithemis	*osvaldae*	

Zygoptera				
Intraspecific comparisons above 2%		Interspecific comparison below 2%		
Africocypha	*varicolor*	*Africallagma*	*elongatum*	
Agriocnemis	*femina*	*Africallagma*	*quingentum*	
Agriocnemis	*pygmaea*	*Agriocnemis*	*forcipata*	
Argia	*moesta*	*Agriocnemis*	*keralensis*	
Argiocnemis	*rubescens*	*Archiargiolestes*	*parvulus*	
Argiolestes	*roon*	*Archiargiolestes*	*pusillissimus*	
Argiolestes	*tuberculiferus*	*Aristocypha*	*fenestrella*	*x*
Atrocalopteryx	*atrata*	*Austroargiolestes*	*alpinus*	
Austroargiolestes	*icteromelas*	*Austroargiolestes*	*calcaris*	
Calopteryx	*japonica*	*Austroargiolestes*	*christine*	

Calopteryx	*maculata*	*Cercion*	*hieroglyphicum*	*x*
Ceriagrion	*auranticum*	*Ceriagrion*	*glabrum*	
Ceriagrion	*glabrum*	*Ceriagrion*	*suave*	
Ceriagrion	*suave*	*Ceylonosticta*	*brincki*	
Ceriagrion	*whellani*	*Ceylonosticta*	*digna*	
Ceylonosticta	*bine*	*Ceylonosticta*	*inferioreducta*	
Coeliccia	*nemoricola*	*Ceylonosticta*	*lankanensis*	
Coeliccia	*ryukyuensis*	*Ceylonosticta*	*mirifica*	
Coenagrion	*lanceolatum*	*Ceylonosticta*	*montana*	
Coenagrion	*mercuriale*	*Ceylonosticta*	*nietneri*	
Coenagrion	*puella*	*Ceylonosticta*	*submontana*	
Coryphagrion	*grandis*	*Ceylonosticta*	*tropica*	
Devadatta	*aran*	*Ceylonosticta*	*walli*	
Devadatta	*argyoides*	*Coenagrion*	*puella*	
Devadatta	*clavicauda*	*Coenagrion*	*pulchellum*	
Devadatta	*cyanocephala*	*Drepanosticta*	*attala*	
Devadatta	*tanduk*	*Drepanosticta*	*barbatula*	
Drepanosticta	*lestoides*	*Elattoneura*	*glauca*	
Dysphaea	*dimidiata*	*Elattoneura*	*tropicalis*	
Elattoneura	*glauca*	*Enallagma*	*annexum*	
Elattoneura	*tropicalis*	*Enallagma*	*boreale*	
Elattoneura	*vittata*	*Enallagma*	*circulatum*	
Enallagma	*hageni*	*Enallagma*	*civile*	
Euphaea	*yayeyamana*	*Enallagma*	*clausum*	
Ischnura	*aurora*	*Enallagma*	*cyathigerum*	
Ischnura	*elegans*	*Enallagma*	*divagans*	
Ischnura	*senegalensis*	*Enallagma*	*doubledayi*	
Lestes	*dryas*	*Enallagma*	*ebrium*	
Lestes	*temporalis*	*Enallagma*	*geminatum*	
Matrona	*basilaris*	*Enallagma*	*hageni*	
Melanesobasis	*corniculata*	*Erythromma*	*humerale*	
Nehalennia	*speciosa*	*Erythromma*	*najas*	
Nesobasis	*rufostigma*	*Ischnura*	*asiatica*	*x*
Neurolestes	*trinervis*	*Ischnura*	*elegans*	
Onychargia	*atrocyana*	*Ischnura*	*graellsii*	
Paracercion	*calamorum*	*Ischnura*	*posita*	
Paracercion	*hieroglyphicum*	*Ischnura*	*verticalis*	
Paracercion	*melanotum*	*Lestes*	*disjunctus*	
Paracercion	*sieboldii*	*Lestes*	*rectangularis*	
Paracercion	*v-nigrum*	*Matrona*	*basilaris*	
Platysticta	*apicalis*	*Matrona*	*cyanoptera*	
Pseudagrion	*bicoerulans*	*Melanesobasis*	*maculosa*	
Pseudagrion	*kersteni*	*Melanesobasis*	*mcleani*	
Pseudagrion	*pilidorsum*	*Mnais*	*andersoni*	
Pseudagrion	*tanganyicum*	*Mnais*	*costalis*	
Psolodesmus	*mandarinus*	*Mnais*	*pruinosa*	
Pyrrhosoma	*nymphula*	*Mnais*	*yunosukei*	
Rhinocypha	*ogasawarensis*	*Nesobasis*	*comosa*	
Rhipidolestes	*aculeatus*	*Nesobasis*	*heteroneura*	
Rhipidolestes	*amamiensis*	*Paracercion*	*hieroglyphicum*	

Rhipidolestes	*okinawanus*	*Paracercion*	*melanotum*	
Rhipidolestes	*shozoi*	*Paracercion*	*sieboldii*	
Rhipidolestes	*yakusimensis*	*Paracercion*	*v-nigrum*	
Stenagrion	*dubium*	*Platysticta*	*greeni*	
Umma	*gumma*	*Platysticta*	*maculata*	
Vestalis	*gracilis*	*Platysticta*	*serendibica*	
		Pseudagrion	*acaciae*	
		Pseudagrion	*massaicum*	
		Pseudagrion	*niloticum*	
		Pseudagrion	*tanganyicum*	
		Pyrrhosoma	*elisabethae*	
		Pyrrhosoma	*nymphula*	
		Rhinocypha	*chaoi*	x
		Rhipidolestes	*okinawanus*	
		Rhipidolestes	*shozoi*	
		Synlestes	*selysi*	
		Synlestes	*weyersii*	
		Telosticta	*bidayuh*	
		Telosticta	*dayak*	
		Vestalis	*apicalis*	
		Vestalis	*gracilis*	

S9 Table. List of species which showed intraspecific comparison values above 3% or interspecific comparison values below 3%. x, species which presented interspecific comparisons values below the threshold with species of another genus.

Anisoptera				
Intraspecific comparisons above 3%		Interspecific comparison below 3%		
Acisoma	*panorpoides*	*Acisoma*	*inflatum*	
Acisoma	*trifidum*	*Acisoma*	*variegatum*	
Aeshna	*crenata*	*Aeshna*	*canadensis*	
Aeshna	*juncea*	*Aeshna*	*constricta*	
Aeshna	*umbrosa*	*Aeshna*	*cyanea*	
Aethriamanta	*brevipennis*	*Aeshna*	*eremita*	
Anaciaeschna	*jaspidea*	*Aeshna*	*grandis*	
Anotogaster	*chaoi*	*Aeshna*	*interrupta*	
Anotogaster	*klossi*	*Aeshna*	*juncea*	
Anotogaster	*sieboldii*	*Aeshna*	*rileyi*	
Asiagomphus	*amamiensis*	*Aeshna*	*septentrionalis*	
Boyeria	*grafiana*	*Aeshna*	*serrata*	
Brachydiplax	*chalybea*	*Aeshna*	*sitchensis*	
Brachydiplax	*sobrina*	*Aeshna*	*subarctica*	
Brachythemis	*contaminata*	*Aeshna*	*subpupillata*	
Chlorogomphus	*brunneus*	*Aeshna*	*umbrosa*	
Cordulegaster	*helladica*	*Aeshna*	*vercanica*	
Crocothemis	*servilia*	*Aeshna*	*viridis*	
Davidius	*moiwanus*	*Allorrhizucha*	*preussi*	*x*
Eleuthemis	*buettikoferi*	*Anaciaeschna*	*jaspidea*	*x*
Gomphus	*pulchellus*	*Anax*	*congoliath*	
Gynacantha	*bullata*	*Anax*	*gladiator*	
Gynacantha	*nigeriensis*	*Anax*	*guttatus*	
Hagenius	*brevistylus*	*Anax*	*imperator*	
Ictinogomphus	*decoratus*	*Anax*	*junius*	
Libellula	*quadrimaculata*	*Anax*	*nigrofasciatus*	
Macromia	*illinoiensis*	*Anax*	*panybeus*	
Nannophya	*pygmaea*	*Anax*	*parthenope*	
Neallogaster	*pekinensis*	*Anax*	*rutherfordi*	
Neurothemis	*fluctuans*	*Anax*	*speratus*	
Ophiogomphus	*mainensis*	*Anax*	*tristis*	
Orthetrum	*japonicum*	*Anectothemis*	*apicalis*	*x*
Orthetrum	*luzonicum*	*Aphylla*	*angustifolia*	
Orthetrum	*melania*	*Aphylla*	*protracta*	
Orthetrum	*pruinosum*	*Arigomphus*	*cornutus*	
Orthetrum	*triangulare*	*Arigomphus*	*furcifer*	
Pantala	*flavescens*	*Arigomphus*	*lentulus*	
Paragomphus	*abnormis*	*Arigomphus*	*pallidus*	
Paragomphus	*clausnitzerorum*	*Arigomphus*	*submedianus*	
Paragomphus	*cognatus*	*Arigomphus*	*villosipes*	
Paragomphus	*darwalli*	*Boyeria*	*grafiana*	*x*
Paragomphus	*machadoi*	*Brachydiplax*	*chalybea*	

Paragomphus	*nigroviridis*	*Brachydiplax*	*sobrina*	
Planaeschna	*ishigakiana*	*Burmagomphus*	*arboreus*	
Planaeschna	*milnei*	*Burmagomphus*	*collaris*	
Planaeschna	*risi*	*Burmagomphus*	*divaricatus*	
Shaogomphus	*postocularis*	*Burmagomphus*	*sowerbyi*	
Somatochlora	*alpestris*	*Congothemis*	*longistyla*	*x*
Somatochlora	*dido*	*Crocothemis*	*servilia*	*x*
Somatochlora	*elongata*	*Davidius*	*moiwanus*	
Stylogomphus	*albistylus*	*Davidius*	*nanus*	
Stylogomphus	*ryukyuanus*	*Dromogomphus*	*armatus*	
Sympetrum	*baccha*	*Dromogomphus*	*spinosus*	
Sympetrum	*danae*	*Eleuthemis*	*buettikoferi*	
Sympetrum	*meridionale*	*Eleuthemis*	*eogaster*	
Sympetrum	*parvulum*	*Epophthalmia*	*elegans*	*x*
Sympetrum	*risi*	*Erpetogomphus*	*compositus*	
Tanypteryx	*pryeri*	*Erpetogomphus*	*heterodon*	
Tramea	*transmarina*	*Erpetogomphus*	*lampropeltis*	
Trigomphus	*citimus*	*Gomphus*	*abbreviatus*	
Trigomphus	*melampus*	*Gomphus*	*adelphus*	
Trithemis	*kirbyi*	*Gomphus*	*apomyius*	
Urothemis	*venata*	*Gomphus*	*australis*	
Zygonyx	*flavicosta*	*Gomphus*	*borealis*	
		Gomphus	*cavillaris*	
		Gomphus	*consanguis*	
		Gomphus	*crassus*	
		Gomphus	*descriptus*	
		Gomphus	*diminutus*	
		Gomphus	*exilis*	
		Gomphus	*externus*	
		Gomphus	*fraternus*	
		Gomphus	*geminatus*	
		Gomphus	*graslinellus*	
		Gomphus	*hodgesi*	
		Gomphus	*hybridus*	
		Gomphus	*lineatifrons*	
		Gomphus	*lividus*	
		Gomphus	*lynnae*	
		Gomphus	*militaris*	
		Gomphus	*minutus*	
		Gomphus	*modestus*	
		Gomphus	*ozarkensis*	
		Gomphus	*parvidens*	
		Gomphus	*pulchellus*	*x*
		Gomphus	*quadricolor*	
		Gomphus	*rogersi*	
		Gomphus	*sandrius*	
		Gomphus	*septima*	
		Gomphus	*spicatus*	
		Gomphus	*vastus*	
		Gomphus	*ventricosus*	

Gomphus	*viridifrons*	
Gomphus	*westfalli*	
Gynacantha	*congolica*	
Gynacantha	*manderica*	
Ictinogomphus	*decoratus*	
Ictinogomphus	*rapax*	
Ladona	*deplanata*	
Ladona	*exusta*	
Lanthus	*parvulus*	
Lanthus	*vernalis*	
Leucorrhinia	*glacialis*	
Leucorrhinia	*hudsonica*	
Leucorrhinia	*intacta*	
Leucorrhinia	*patricia*	
Leucorrhinia	*proxima*	
Libellula	*auripennis*	
Libellula	*axilena*	
Libellula	*comanche*	
Libellula	*cyanea*	
Libellula	*forensis*	
Libellula	*incesta*	
Libellula	*jesseana*	
Libellula	*luctuosa*	
Libellula	*needhami*	
Libellula	*nodistica*	
Libellula	*pulchella*	
Macromia	*chaiyaphumensis*	
Macromia	*gerstaeckeri*	
Macromia	*illinoiensis*	*x*
Macromia	*urania*	
Neodythemis	*katanga*	*x*
Nihonogomphus	*lieftincki*	
Nihonogomphus	*thomassoni*	
Onychogomphus	*malabarensis*	*x*
Ophiogomphus	*acuminatus*	*x*
Ophiogomphus	*anomalus*	*x*
Ophiogomphus	*arizonicus*	
Ophiogomphus	*aspersus*	*x*
Ophiogomphus	*australis*	*x*
Ophiogomphus	*bison*	
Ophiogomphus	*carolus*	*x*
Ophiogomphus	*edmundo*	*x*
Ophiogomphus	*howei*	*x*
Ophiogomphus	*incurvatus*	*x*
Ophiogomphus	*mainensis*	*x*
Ophiogomphus	*morrisoni*	
Ophiogomphus	*occidentis*	
Ophiogomphus	*rupinsulensis*	*x*
Ophiogomphus	*severus*	
Ophiogomphus	*smithi*	*x*

Ophiogomphus	*susbehcha*	*x*
Ophiogomphus	*westfalli*	*x*
Orthemis	*ferruginea*	
Orthemis	*schmidti*	
Orthetrum	*internum*	
Orthetrum	*japonicum*	
Orthetrum	*lusinga*	
Orthetrum	*melania*	
Orthetrum	*pruinosum*	
Orthetrum	*sabina*	*x*
Orthetrum	*saegeri*	
Orthetrum	*testaceum*	
Orthetrum	*triangulare*	
Orthetrum	*umbratum*	
Paragomphus	*alluaudi*	
Paragomphus	*cognatus*	
Paragomphus	*viridior*	
Phyllopetalia	*apicalis*	*x*
Porpacithemis	*dubia*	*x*
Progomphus	*bellei*	
Progomphus	*obscurus*	
Rhyothemis	*phyllis*	*x*
Rhyothemis	*variegata*	*x*
Somatochlora	*arctica*	
Somatochlora	*dido*	
Somatochlora	*elongata*	
Somatochlora	*exuberata*	
Somatochlora	*franklini*	
Somatochlora	*metallica*	
Somatochlora	*minor*	
Somatochlora	*semicircularis*	
Somatochlora	*uchidai*	
Somatochlora	*williamsoni*	
Stylogomphus	*albistylus*	*x*
Stylogomphus	*sigmastylus*	
Stylurus	*amnicola*	
Stylurus	*intricatus*	
Stylurus	*ivae*	
Stylurus	*laurae*	
Stylurus	*nagoyanus*	
Stylurus	*notatus*	
Stylurus	*oculatus*	
Stylurus	*olivaceus*	
Stylurus	*spiniceps*	
Stylurus	*townesi*	
Sympetrum	*croceolum*	
Sympetrum	*darwinianum*	
Sympetrum	*depressiusculum*	
Sympetrum	*frequens*	
Sympetrum	*internum*	

		Sympetrum	*janeae*	
		Sympetrum	*maculatum*	
		Sympetrum	*nigrescens*	
		Sympetrum	*obtrusum*	
		Sympetrum	*occidentale*	
		Sympetrum	*pallipes*	
		Sympetrum	*parvulum*	
		Sympetrum	*rubicundulum*	
		Sympetrum	*semicinctum*	
		Sympetrum	*signiferum*	
		Sympetrum	*striolatum*	
		Sympetrum	*uniforme*	
		Sympetrum	*vicinum*	
		Tetragoneuria	*canis*	
		Tetragoneuria	*cynosura*	
		Tramea	*loewii*	
		Tramea	*propinqua*	
		Tramea	*transmarina*	
		Tramea	*virginia*	
		Trigomphus	*citimus*	
		Trigomphus	*interruptus*	
		Trigomphus	*melampus*	
		Trigomphus	*nigripes*	
		Trigomphus	*ogumai*	
		Trithemis	*grouti*	
		Trithemis	*osvaldae*	*x*
		Trithemis	*stictica*	

Zygoptera				
Intraspecific comparisons above 3%		Interspecific comparison below 3%		
Agriocnemis	*pygmaea*	*Africallagma*	*elongatum*	
Argia	*moesta*	*Africallagma*	*quingentum*	
Argiocnemis	*rubescens*	*Africallagma*	*vaginale*	
Argiolestes	*roon*	*Agriocnemis*	*forcipata*	
Argiolestes	*tuberculiferus*	*Agriocnemis*	*keralensis*	
Atrocalopteryx	*atrata*	*Archiargiolestes*	*parvulus*	
Calopteryx	*japonica*	*Archiargiolestes*	*pusillissimus*	
Ceriagrion	*auranticum*	*Aristocypha*	*fenestrella*	*x*
Ceriagrion	*whellani*	*Austroargiolestes*	*alpinus*	
Ceylonosticta	*bine*	*Austroargiolestes*	*calcaris*	
Coeliccia	*ryukyuensis*	*Austroargiolestes*	*christine*	
Coenagrion	*lanceolatum*	*Austroargiolestes*	*chrysoides*	
Coenagrion	*mercuriale*	*Austroargiolestes*	*icteromelas*	
Coenagrion	*puella*	*Cercion*	*hieroglyphicum*	*x*
Coryphagrion	*grandis*	*Ceriagrion*	*glabrum*	
Devadatta	*aran*	*Ceriagrion*	*suave*	
Devadatta	*clavicauda*	*Ceylonosticta*	*brincki*	
Devadatta	*cyanocephala*	*Ceylonosticta*	*digna*	
Dysphaea	*dimidiata*	*Ceylonosticta*	*inferioreducta*	
Elattoneura	*glauca*	*Ceylonosticta*	*lankanensis*	

Elattoneura	*tropicalis*	*Ceylonosticta*	*mirifica*	
Enallagma	*hageni*	*Ceylonosticta*	*montana*	
Ischnura	*aurora*	*Ceylonosticta*	*nietneri*	
Ischnura	*elegans*	*Ceylonosticta*	*submontana*	
Ischnura	*senegalensis*	*Ceylonosticta*	*tropica*	
Lestes	*dryas*	*Ceylonosticta*	*walli*	
Lestes	*temporalis*	*Coeliccia*	*cyaneothorax*	
Matrona	*basilaris*	*Coeliccia*	*cyanomelas*	*x*
Melanesobasis	*corniculata*	*Coeliccia*	*nemoricola*	
Nehalennia	*speciosa*	*Coenagrion*	*interrogatum*	
Nesobasis	*rufostigma*	*Coenagrion*	*puella*	
Neurolestes	*trinervis*	*Coenagrion*	*pulchellum*	
Onychargia	*atrocyana*	*Coenagrion*	*resolutum*	
Paracercion	*calamorum*	*Copera*	*annulata*	
Paracercion	*melanotum*	*Copera*	*tokyoensis*	
Paracercion	*sieboldii*	*Drepanosticta*	*attala*	
Paracercion	*v-nigrum*	*Drepanosticta*	*barbatula*	
Pseudagrion	*bicoerulans*	*Elattoneura*	*glauca*	
Pseudagrion	*pilidorsum*	*Elattoneura*	*tropicalis*	
Psolodesmus	*mandarinus*	*Enallagma*	*annexum*	
Pyrrhosoma	*nymphula*	*Enallagma*	*boreale*	
Rhinocypha	*ogasawarensis*	*Enallagma*	*circulatum*	
Rhipidolestes	*aculeatus*	*Enallagma*	*civile*	
Rhipidolestes	*amamiensis*	*Enallagma*	*clausum*	
Rhipidolestes	*okinawanus*	*Enallagma*	*cyathigerum*	
Rhipidolestes	*shozoi*	*Enallagma*	*divagans*	
Rhipidolestes	*yakusimensis*	*Enallagma*	*doubledayi*	
Stenagrion	*dubium*	*Enallagma*	*ebrium*	
Umma	*gumma*	*Enallagma*	*geminatum*	
		Enallagma	*hageni*	
		Erythromma	*humerale*	
		Erythromma	*najas*	
		Griseargiolestes	*bucki*	
		Griseargiolestes	*eboracus*	
		Hetaerina	*laesa*	
		Hetaerina	*sanguinea*	
		Indocnemis	*ambigua*	x
		Ischnura	*asiatica*	x
		Ischnura	*elegans*	
		Ischnura	*graellsii*	
		Ischnura	*posita*	
		Ischnura	*verticalis*	
		Lestes	*disjunctus*	
		Lestes	*rectangularis*	
		Lestes	*sponsa*	
		Lestes	*unguiculatus*	
		Matrona	*basilaris*	
		Matrona	*cyanoptera*	
		Melanesobasis	*maculosa*	
		Melanesobasis	*mcleani*	

Melanesobasis	*simmondsi*	
Mnais	*andersoni*	
Mnais	*costalis*	
Mnais	*pruinosa*	
Mnais	*yunosukei*	
Nesobasis	*comosa*	
Nesobasis	*heteroneura*	
Paracercion	*hieroglyphicum*	
Paracercion	*melanotum*	
Paracercion	*sieboldii*	
Paracercion	*v-nigrum*	
Platysticta	*greeni*	
Platysticta	*maculata*	
Platysticta	*serendibica*	
Pseudagrion	*acaciae*	
Pseudagrion	*massaicum*	
Pseudagrion	*niloticum*	
Pseudagrion	*tanganyicum*	
Pyrrhosoma	*elisabethae*	
Pyrrhosoma	*nymphula*	
Rhinocypha	*chaoi*	x
Rhipidolestes	*okinawanus*	
Rhipidolestes	*shozoi*	
Synlestes	*selysi*	
Synlestes	*weyersii*	
Telosticta	*bidayuh*	
Telosticta	*dayak*	
Vestalis	*apicalis*	
Vestalis	*gracilis*	