Hesperiidae (Lepidoptera, Hesperioidea) from Ponta Grossa, Paraná, Brazil: 70 years of records with special reference to faunal composition of Vila Velha State Park

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ABSTRACT. Hesperiidae (Lepidoptera, Hesperioidea) from Ponta Grossa, Paraná, Brazil: 70 years of records with special reference to faunal composition of Vila Velha State Park. The municipality of Ponta Grossa has a peculiar ecosystem, originally composed of Mixed Ombrophilous Forest and natural isolated fragments of Araucaria forest interconnected by large areas of the steppe phytophysionomy known as the Brazilian "*campos*" (grasslands). However, both ecosystems have been continually reduced by human occupation, with remnants still found in the Vila Velha State Park, whose floristic composition has been recently related to the Cerrado biome. Few studies have been dedicated to recognize the characteristic fauna of these grasslands and its relationship with other Brazilian vegetation types, which has motivated this study. After gathering information from more than 70 years of collecting in the region, a list of 225 species of Hesperiidae (Lepidoptera, Hesperioidea) recorded within the municipality is provided, of which 162 are indicator species of forest environments and 53 of open areas. The Vila Velha State Park contributes to the conservation of 65% of the species and its skipper community shows a closer affinity to the Pampas and Cerrado instead of forested habitats. This relation may be attributed to its precise localization between both ecosystems, since geographical distances affect similarities on Hesperiidae assemblages. The flora of Vila Velha can also influence the observed pattern, since a considerably number of species found in the region are also found in Cerrado. Further studies are still required among Brazilian grassland habitats, especially in the Cerrado enclaves within the states of Paraná and São Paulo in attempt to better understand the mechanisms that drive the community dynamics in those areas.

KEYWORDS. Biodiversity; conservation unit; grasslands; inventory; skippers.

RESUMO. Hesperiidae (Lepidoptera, Hesperioidea) de Ponta Grossa, Paraná, Brazil: 70 anos de registros com especial referência à composição faunística do Parque Estadual de Vila Velha. O município de Ponta Grossa se destaca por apresentar originalmente uma paisagem peculiar onde capões isolados de Floresta Ombrófila Mista são interligados por grandes extensões de fitofisionomias estépicas, também denominadas campos. No entanto, ambos os ecossistemas atualmente se encontram altamente ameaçados pela ocupação humana, restando na região o Parque Estadual de Vila Velha, cuja composição florística tem sido recentemente relacionada com o bioma Cerrado. Poucos trabalhos são dedicados à caracterização da fauna dos campos e sua relação com outras fitofisionomias estépicas brasileiras, motivo que suscitou a realização deste estudo. Após reunir informações de coletas realizadas por mais de 70 anos, são listadas 225 espécies de Hesperiidae (Lepidoptera, Hesperioidea) presentes no município, entre elas 162 indicadoras de ambientes florestais e 53 de áreas abertas. O Parque Estadual de Vila Velha contribui para a conservação de 65% delas enquanto sua composição se mostra intimamente relacionada tanto aos Pampas como ao Cerrado, em detrimento de hábitats florestais. Tal relação é dada provavelmente pela localização geográfica de Vila Velha, visto que a similaridade da fauna de Hesperiidae se encontrou influenciada pelas distâncias geográficas das amostras no presente estudo. A flora de Vila Velha também deve afetar diretamente a composição observada de Hesperiidae, uma vez que uma grande parte de suas espécies são também encontradas em áreas de Cerrado. No entanto, estudos em ambientes campestres brasileiros ainda se fazem necessários, especialmente em enclaves de Cerrado no Paraná e em São Paulo, para que se adquira um melhor entendimento da dinâmica de suas comunidades.

PALAVRAS-CHAVE. Biodiversidade; borboletas; campos; inventário; unidade de conservação.

The municipality of Ponta Grossa is located in the Second Plateau of the State of Paraná within the Atlantic Forest biome, represented by the Araucaria Forest ecosystem. The region is also dominated by a grassland vegetation type called "*campos*" (Garcia *et al.* 2009), interspersed by gallery forests and isolated fragments of Araucaria forest, on a predominantly shallow and sandy soil (Maack 1968; Guimarães *et al.* 2009). The most outstanding preservation area in this municipality is the Vila Velha State Park (VVSP), which is intensively visited due to its wide variety of geomorphological attractions. The park also presents a number of Cerrado elements and a typical alluvial forest besides its river streams (Cervi *et al.* 2007; Gonçalves *et al.* 2009). Due to this complexity, current literature provides an extensive discussion about the characterization and classification of this vegetation, as well as of the Parana's Grasslands region, focusing on the identification of its origin and the similarities with other Brazilian ecosystems (Veloso *et al.* 1991; Ritter *et al.* 2007; Cervi *et al.* 2007).

Among the butterflies, a group constantly cited as a bioindicator, little is known about the species composition, richness and endemism in grassland regions. In Brazil, the

regions which have already been studied are concentrated mostly in the Pampas (*i.e.* Krüger & Silva 2003; Marchiori & Romanowski 2006a; Marchiori & Romanowski 2006b; Paz *et al.* 2008; Rosa *et al.* 2011), although grassland habitats have also been sampled in other biomes, such as Mata Atlântica (Iserhard *et al.* 2010; Dolibaina *et al.* 2011; Pedrotti *et al.* 2011), Pantanal (Brown 1987), Cerrado (Brown & Mielke 1967a; Brown & Mielke 1967b; Brown 1987; Mielke *et al.* 2008), and Caatinga (Nobre *et al.* 2008). Nevertheless, studies frequently do not include the Hesperioidea (*e.g.* Krüger & Silva 2003; Paz *et al.* 2008) due to difficulties with the preparation and identification of its species.

To contribute to the knowledge of butterfly composition and distribution in grassland habitats, this study aimed to prepare a species list of Hesperiidae of Ponta Grossa municipality and VVSP, indicating the potential contribution of the park to the conservation of the Brazilian biodiversity. Additionally, species composition of VVSP was compared with other Hesperiidae lists made in different ecosystems, aiming to characterize its fauna and indicate, trough an entomological perspective, which vegetation type in Brazil influences the VVSP species composition.

MATERIAL AND METHODS

The list was obtained through the identification of specimens deposited in the Padre Jesus Santiago Moure Entomological Collection (DZUP), located in Universidade Federal do Paraná, Curitiba, Paraná, Brasil. This collection comprises specimens from all seasons, collected mostly by Felipe Justus (autonomous researcher residing in Ponta Grossa from 1939 to 1961) and O. Mielke (1966 to 2010), compiling a high intensive sampling effort that represents a reliable scenario of the species richness and composition of Hesperiidae. Specimens labels present exact location of districts within Ponta Grossa municipality, which nowadays corresponds to neighborhood inside the city, such as C. Bruhm, Campo, Jardim, Lageado, Nova Rússia, Oficinas, Olarias, Pedreira, Prainha, Ronda, Quintal (personal backyard of Felipe Justus' house) and Taquari. Other localities, however, correspond to more distant regions (10 km N Ponta Grossa, 20 km N Piriquitos, Piriquitos, Vila Velha) where the urban expansion and anthropogenic effects are reduced. Therefore, it was possible to identify and analyze species collected inside the VVSP from those collected in other regions of the municipality, here assigned as "city". For a full description of the vegetation of the park and the region see Cervi *et al.* (2007) and Guimarães *et al.* (2009).

All listed species were classified with respect to their habitat preference, as follows: forest (species typically found in forested habitats); open areas (species typically from habitats without a canopy, which can include areas of Pampas, Cerrado, Caatinga or even anthropic localities). This classification aims to characterize the studied areas and to increase the knowledge of bioindicator butterflies groups and/or species.

A NMDS analysis based on Dice similarity index (Dice 1945) was performed to identify the faunal similarity relationship of the VVSP with other Brazilian vegetation types. Dice similarity index was chosen because it showed to be more appropriate when samples present differences on sampling effort (Wolda 1981). Published species lists for other ecosystems were used for comparison, as follows: Cerrado (Brown Jr. 1987; Mielke *et al.* 2008), Pampas (Biezanko & Freitas 1938; Biezanko 1963; Canals 2000; Marchiori & Romanowski 2006a; Nuñez-Bustos 2007; Rosa *et al.* 2011; and additional data from specimens deposited in the DZUP) and Atlantic Forest (Mielke 1968; Mielke & Casagrande 1997; Iserhard & Romanowski 2004; Carneiro *et al.* 2008; Nuñez-Bustos 2009; Francini *et al.* 2011). These localities were selected because they represent the typical fauna of the ecosystem where they are located, without the influence from neighboring ecosystems. The papers of Marchiori & Romanowski (2006a), Rosa *et al.* (2011) for Espinilho and Uruguaiana, as well as Canals (2000) and Nuñez-Bustos (2009) for Buenos Aires, had their species list complemented because of the close proximity between localities containing the same vegetation type. Additionally, an ANOSIM analysis was performed, where vegetation types were indicated as factors. P values were adjusted with Bonferroni's correction even thought it did not change the significance of results. Finally, a RELATE test based on Spearman rank correlation method was used to determine if the geographic distance influences the similarity between localities. For this test, Dice similarity index was again used for fauna, while Euclidian distance was used as a measurement of geographical distance.

RESULTS

A total of 225 species of Hesperiidae are presented for Ponta Grossa (Table I), of which 21 have not been recorded during the last fifty years of study, even after an intensive sampling effort (99 days of collecting). Although most of the listed species are indicators of forested habitats (162 spp.), the region is strongly marked by the presence of typical open area species (53 spp.), and few generalist species (10 spp.).

The presence of two subspecies of *Epargyreus socus* (*E. socus socus* and *E. socus pseudexadeus*), collected together in the same region, with differences in their genitalia morphology (O. Mielke pers. observ.), suggests that these taxa should be treated as different species, although more refined taxonomic studies are necessary to confirm this hypothesis.

The VVSP contributes to the conservation of 149 species, approximately 65% of the total richness, with the remaining 76 species exclusively found in other localities of the entire region. From the total, 90 species are indicators of forested environments, while 50 are indicators of open areas and nine are generalists.

NMDS analysis showed an ordination of samples, in which vegetation types clearly affect the similarities of Hesperiidae (Fig. 1). However, VVSP's position between Cerrado and Pampas cannot be assigned to any of the vegetation types, since no sample clumping was generated. This result was corroborated by ANOSIM test ($R^2 = 0.63$;

$p < 0.01$), in which the statement of VVSP as Pampas or Cerrado did not influence on correlation value or significance (unpublished data). Additionally, similarity of samples showed to be also influenced by geographical proximity (RELATE, $R^2 = 0.45$; $p < 0.05$).

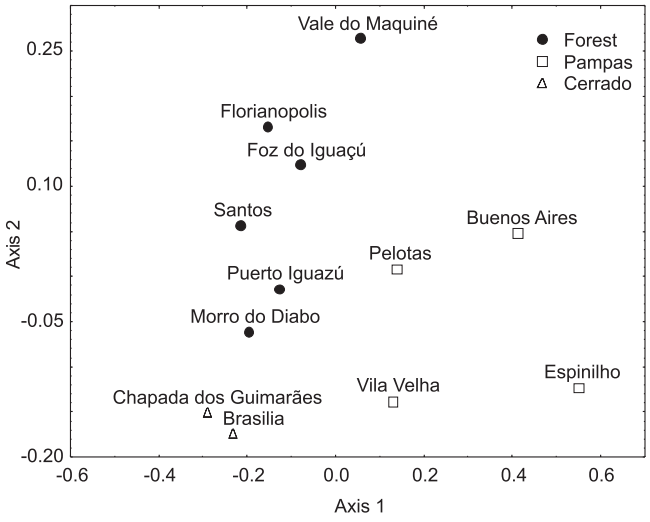

Fig. 1. NMDS Analysis illustrating the proximity between the Hesperiidae communities in different Brazilian ecosystems. Stress = 0.12.

DISCUSSION

The high number of species recorded to Ponta Grossa is primarily a result of the extensive and intensive sampling effort in the region (more than 70 years of collecting), and secondarily to the environmental heterogeneity which comprises species typical of forested regions and open areas, such as the Natural Grasslands (Cervi *et al.* 2007). Curitiba, a city with similar vegetation heterogeneity, also presents a similar number of recorded species, with 210 published species (C. Mielke 1994), plus 34 registered later (O. Mielke unpublished data). Such inventories, although still not considered complete, present a high number of species richness when compared to other inventories which include only one or two years of sampling (*e.g*. Mielke 1968; Mielke & Casagrande 1997; Iserhard & Romanowski 2004; Carneiro *et al.* 2008; Iserhard *et al.* 2010).

The indication that 21 species of butterflies were not recorded during the last 50 years should not be used as an argument of local extinction, regardless the temporal series of sampling along this period. The absence of many species may be due to difficulties in sampling megadiverse groups (Santos 2003), which are, in general, comprised by a large number of "rare" species. Adult migration or dispersal from their natural habitat may be one of the causes of the supposed rarity of some species. For instance, it can be presumed that some individual of *Heliopetes libra*, *Urbanus chalco* and *Urbanus virescens,* coming from west regions in Paraná state occasionally disperse to Ponta Grossa, due to the fact that these butterflies are common in Seasonal Semideciduous Forest (O. Mielke 1968; Nuñez-Bustos 2009) and are not observed in Curitiba (C. Mielke 1994). This is an important task, because the lack of this kind of more precise data prevents the correct delimitation of species distributions and occurrence.

Concerning the use of butterflies as bioindicators, it is important to point out that, even in a predominantly grasslands region, the adjacent presence of isolated fragments of Araucaria Forest, together with a rich Hesperiidae fauna, directly influences the number and composition of the local community. Many forest species leave these fragments to foraging in open environments, a phenomenon also observed in other biomes such as in the Cerrado and Caatinga (O. Mielke pers. observ.), where gallery forest species are also observed on flowers in grassland areas.

Therefore, the VVSP presents itself as an important tool on preserving the open area skipper species, which can be found in Ponta Grossa and in Grasslands of Paraná as a whole. Nevertheless, the forested portions of the Park are insufficient for the conservation of Araucaria Forest species of butterflies. Therefore, it is necessary and urgent to create other regional protected areas in order to preserve a larger part of this extremely threatened ecosystem, of which currently only 1% of its original cover remains (Cervi *et al.* 2007).

NMDS analyses indicated that those ecosystems, traditionally recognized in Brazilian conservation policies, play a direct effect on the skippers communities' composition. Strikingly, VVSP appears to be influenced by both grasslands ecosystems present on north and south of its limits, where its geographical localization and flora composition may be the main factors influencing this mixture of species. A similar pattern was observed for bee assemblages, where although VVSP is more closely related to Pampas areas, a number of species endemic to Cerrado were also found (Gonçalves *et al.* 2009). This number can be even more representative in respect to plants, whose 63% of the grass species and 40% of the entire flora are shared with the flora of Cerrado (Cervi *et al.* 2007). As a conclusion, these authors also suggested that all of Paraná's Grasslands should be classified as belonging to the Cerrado biome. However, based on insect distribution, whether or not VVSP and other grassland habitats should be named as Cerrado or Pampas, might be an arbitrary problem of classification systems, since no biological segregation of communities is actually observed.

CONCLUSION

Although a large part of the species registered in the municipality of Ponta Grossa is also found within the VVSP, the park's participation in local biodiversity conservation is basically restricted to the protection of open area species, making it necessary also to preserve larger forested areas in the region. Hesperiidae assemblage in VVSP is similarly influenced by both grasslands vegetation types (Cerrado and Pampas), despite the park being geographically isolated from both. While the VVSP still needs complementary studies

Table I. List of Hesperiidae species recorded to Ponta Grossa. The collecting locality, preference habitat and the last year of record are indicated for each species. VVSP corresponds to Vila Velha State Park.

	Species	Author	Localitiy	Habitat Preference	Last Record
	Pyrrhopyginae				
1	*Granila paseas*	(Hewitson, 1857)	City	forest	2010
2	*Myscelus amystis epigona*	Herrich-Schäffer, 1869	City	forest	2010
3	*Olafia roscius roscius*	(Hopffer, 1874)	City and VVSP	forest	2010
4	*Pseudocroniades machaon machaon*	(Westwood, 1852)	City	forest	1942
5	*Pyrrhopyge pelota*	(Plötz, 1879)	City and VVSP	open areas	1976
6	*Sarbia antias*	(C. Felder & R. Felder, 1859)	City and VVSP	open areas	1971
	Pyrginae				
	Eudamini				
7	*Aguna asander asander*	(Hewitson, 1867)	City	forest	2010
8	*Astraptes alardus alardus*	(Stoll, 1790)	City	forest	1950
9	*Astraptes anaphus anaphus*	(Cramer, 1777)	City	forest	1941
10	*Astraptes aulus*	(Plötz, 1881)	City	forest	1946
11	*Astraptes elorus*	(Hewitson, 1867)	VVSP	forest	1984
12	*Astraptes fulgerator fulgerator*	(Walch, 1775)	City and VVSP	forest	1983
13	*Astraptes latimargo bifascia*	(Herrich-Schäffer, 1869)	City	forest	1942
14	*Astraptes naxos*	(Hewitson, 1867)	City and VVSP	forest	2002
15	*Autochton integrifascia*	(Mabille, 1891)	City and VVSP	forest	1991
16	*Autochton neis*	(Geyer, 1832)	City	forest	1990
17	*Autochton zarex*	(Hübner, 1818)	City	forest	1942
18	*Celaenorrhinus eligius punctiger*	(Burmeister, 1878)	City and VVSP	forest	1984
19	*Chioides catillus catillus*	(Cramer, 1779)	City and VVSP	forest	1987
20	*Epargyreus enispe ensipe*	(Hewitson, 1867)	City and VVSP	forest	1974
21	*Epargyreus socus socus*	(Hübner, [1825])	City	forest	2010
22	*Epargyreus socus pseudexadeus*	Westwood, 1852	City	forest	1992
23	*Nascus phocus*	(Cramer, 1777)	VVSP	forest	2002
24	*Phanus australis*	(L. Miller, 1965)	City	forest	1948
25	*Phocides charon*	(C. Felder & R. Felder, 1859)	City	forest	1939
26	*Phocides pialia pialia*	(Hewitson, 1857)	City	forest	1959
27	*Phocides polybius phanias*	(Burmeister, 1880)	City	forest	1958
28	*Polygonus leo pallida*	Röber, 1925	City and VVSP	forest	1967
29	*Polygonus savigny savigny*	(Latreille, [1824])	City and VVSP	forest	1987
30	*Polythrix octomaculata*	(Sepp, [1844])	VVSP	forest	2002
31	*Urbanus chalco*	(Hübner, 1823)	City	forest	1941
32	*Urbanus dorantes dorantes*	(Stoll, 1790)	City and VVSP	forest	1967
33	*Urbanus esta*	Evans, 1952	VVSP	forest	2010
34	*Urbanus evenus*	(Ménétriés, 1855)	VVSP	open areas	1972
35	*Urbanus procne*	(Plötz, 1880)	VVSP	forest	2002
36	*Urbanus proteus proteus*	(Linnaeus, 1758)	VVSP	generalist	2010
37	*Urbanus teleus*	(Hübner, 1821)	VVSP	generalist	2002
38	*Urbanus virescens*	(Mabille, 1877)	City	forest	1947
39	*Urbanus zagorus*	(Plötz, 1880)	City	open areas	1949
	Pyrgini				
40	*Achlyodes busirus rioja*	Evans, 1953	City and VVSP	forest	2010
41	*Achlyodes mithridates thraso*	(Hübner, [1807])	City and VVSP	forest	2001
42	*Anisochoria subpicta*	Schaus, 1902	City	forest	1946
43	*Bolla catharina*	(Bell, 1937)	City	forest	1959
44	*Camptopleura auxo*	(Möschler, 1879)	VVSP	forest	2001
45	*Carrhenes canescens pallida*	Röber, 1925	City	forest	1992
46	*Chiomara asychis autander*	(Mabille, 1891)	VVSP	forest	1974
47	*Chiomara basigutta*	(Plötz, 1884)	VVSP	open areas	1987
48	*Chiomara mithrax*	(Möschler, 1879)	VVSP	open areas	1971
49	*Cogia calchas*	(Herrich-Schäffer, 1869)	City and VVSP	open areas	1987
50	*Cogia hassan evansi*	Bell, 1937	VVSP	open areas	1989
51	*Cycloglypha thrasibulus thrasibulus*	(Fabricius, 1793)	City	forest	1956
52	*Diaeus lacaena lacaena*	(Hewitson, 1869)	City	forest	1958
53	*Ebrietas anacreon anacreon*	(Staudinger, 1876)	City	forest	1950
54	*Gesta austerus*	(Schaus, 1902)	City and VVSP	open areas	1989

Continue

Table I. Continued.

	Species	Author	Localitiy	Habitat Preference	Last Record
55	*Gesta heteropterus*	(Plötz, 1884)	VVSP	open areas	1983
56	*Gindanes brebisson brebisson*	(Latreille, [1824])	City	forest	2010
57	*Gorgythion begga begga*	(Prittwitz, 1868)	City and VVSP	forest	1973
58	*Gorgythion beggina escalophoides*	Evans, 1953	VVSP	forest	2009
59	*Grais stigmaticus stigmaticus*	(Mabille, 1883)	City	forest	1948
60	*Heliopetes arsalte*	(Linnaeus, 1758)	City and VVSP	generalist	2001
61	*Heliopetes libra*	Evans, 1944	City	forest	1939
62	*Heliopetes leucola*	(Hewitson, 1868)	City	forest	1967
63	*Heliopetes ochroleuca*	Zikán, 1938	City	forest	1971
64	*Heliopetes omrina*	(Butler, 1870)	VVSP	open areas	1968
65	*Milanion leucaspis*	(Mabille, 1878)	City	forest	1971
66	*Mylon maimon*	(Fabricius, 1775)	City	forest	1990
67	*Nisoniades bipuncta*	(Schaus, 1902)	City	forest	1959
68	*Oechydrus chersis evelinda*	(Butler, 1870)	City	forest	1958
69	*Polyctor polyctor polyctor*	(Prittwitz, 1868)	City	forest	1992
70	*Pyrgus orcynoides*	(Giacomelli, 1928)	City and VVSP	generalist	2002
71	*Pyrgus orcus*	(Stoll, 1780)	City and VVSP	generalist	2010
72	*Pythonides lancea*	(Hewitson, 1868)	City and VVSP	forest	2010
73	*Quadrus u-lucida mimus*	(Mabille & Boullet, 1917)	VVSP	forest	1991
74	*Sostrata bifasciata bifasciata*	(Ménétriés, 1829)	City and VVSP	forest	2001
75	*Staphylus ascalon*	(Staudinger, 1876)	VVSP	forest	2002
76	*Staphylus chlorocephala*	(Latreille, [1824])	City	forest	1990
77	*Telemiades vespasius*	(Fabricius, 1793)	City	forest	2010
78	*Theagenes dichrous*	(Mabille, 1878)	City and VVSP	forest	1971
79	*Timochares trifasciata trifasciata*	(Hewitson, 1868)	City	forest	1971
80	*Viola alicus*	(Schaus, 1902)	VVSP	open areas	1980
81	*Viola minor*	(Hayward, 1933)	VVSP	open areas	1967
82	*Viola violella*	(Mabille, 1898)	VVSP	open areas	1987
83	*Xenophanes tryxus*	(Stoll, 1780)	City	forest	1959
84	*Zera hyacinthinus servius*	(Plötz, 1884)	City and VVSP	forest	2001
85	*Zopyrion evenor evenor*	Godman, 1901	VVSP	forest	1989
	Hesperiinae				
86	*Alera furcata*	Mabille, 1891	City	forest	1940
87	*Anatrytone perfida*	(Möschler, 1879)	VVSP	open areas	1991
88	*Anthoptus epictetus*	(Fabricius, 1793)	City and VVSP	forest	2002
89	*Arita arita*	(Schaus, 1902)	VVSP	forest	1971
90	*Arita mubevensis*	(Bell, 1932)	City	forest	1990
91	*Arita polistion*	(Schaus, 1902)	VVSP	forest	2001
92	*Arotis derasa brunnea*	(Mielke, 1972)	VVSP	forest	2004
93	*Artines satyr*	Evans, 1955	VVSP	open areas	2010
94	*Artines* sp.		VVSP	open areas	2009
95	*Callimormus interpunctata*	(Plötz, 1884)	City and VVSP	forest	1967
96	*Callimormus rivera*	(Plötz, 1882)	City	forest	2010
97	*Calpodes ethlius*	(Stoll, 1782)	City	forest	1948
98	*Chalcone briquenydan australis*	Mielke, 1980	City	forest	1990
99	*Cobalopsis hazarma*	(Hewitson, 1877)	City and VVSP	forest	1991
100	Cobalopsis miaba	(Schaus, 1902)	VVSP	forest	2010
101	Cobalopsis sancoya	(Schaus, 1902)	VVSP	forest	1991
102	Cobalopsis vorgia	(Schaus, 1902)	City	forest	2010
103	Conga chydaea	(Butler, 1877)	City and VVSP	forest	1973
104	*Conga iheringii*	(Mabille, 1891)	VVSP	open areas	1967
105	*Conga urqua*	(Schaus, 1902)	VVSP	open areas	2001
106	*Conga zela*	(Plötz, 1883)	VVSP	open areas	1974
107	*Copaeodes castanea*	Mielke, 1969	VVSP	open areas	2009
108	*Copaeodes jean favor*	Evans, 1955	City and VVSP	open areas	2002
109	*Corticea immocerinus*	(Hayward, 1934)	VVSP	open areas	1973
110	*Corticea noctis*	(Plötz, 1882)	VVSP	forest	2002
111	*Corticea oblinita*	(Mabille, 1891)	VVSP	open areas	1974
112	*Corticea obscura*	Mielke, 1971	VVSP	forest	1984

Continue

Table I. Continued.

	Species	Author	Localitiy	Habitat Preference	Last Record
113	*Corticea* sp.		VVSP	forest	2002
114	*Cumbre cumbre*	(Schaus, 1902)	VVSP	forest	2009
115	*Cumbre* sp. 1		VVSP	forest	2002
116	*Cumbre* sp. 2		City	forest	1990
117	*Cymaenes cavalla*	Evans, 1955	VVSP	forest	2010
118	*Cymaenes gisca*	Evans, 1955	VVSP	forest	2010
119	*Cymaenes laureolus loxa*	Evans, 1955	VVSP	forest	2010
120	*Cymaenes modestus*	(Hayward, 1943)	City	forest	1975
121	*Cymaenes perloides*	(Plötz, 1882)	City and VVSP	forest	2002
122	*Cymaenes tripunctata tripunctata*	(Latreille, [1824])	VVSP	forest	2002
123	*Cymaenes tripunctus theogenis*	(Capronnier, 1874)	VVSP	forest	1975
124	*Cymaenes warreni*	(Weeks, 1901)	City and VVSP	open areas	2010
125	*Cynea trimacula*	(Herrich-Schäffer, 1869)	City	forest	1953
126	*Decinea decinea decinea*	(Hewitson, 1876)	VVSP	forest	1991
127	*Decinea lucifer*	(Hübner, [1831])	VVSP	forest	2002
128	*Decinea percosius*	(Godman, 1900)	VVSP	forest	2002
129	*Dion meda*	(Hewitson, 1877)	City and VVSP	forest	1991
130	*Euphyes cherra*	Evans, 1955	VVSP	open areas	2001
131	*Euphyes leptosema*	(Mabille, 1891)	VVSP	forest	1973
132	*Eutychide physcella*	(Hewitson, 1866)	VVSP	forest	2002
133	*Hansa devergens hydra*	Evans, 1955	City and VVSP	forest	2001
134	*Hylephila ancora*	(Plötz, 1883)	City and VVSP	open areas	1972
135	*Hylephila phyleus phyleus*	(Drury, 1773)	City and VVSP	generalist	1987
136	*Lamponia lamponia*	(Hewitson, 1876)	City	forest	1990
137	*Lento krexoides*	(Hayward, 1940)	City	forest	1990
138	*Lerema duroca lenta*	Evans, 1955	City	forest	2010
139	*Lerodea erythrostictus*	(Prittwitz, 1868)	VVSP	open areas	1973
140	*Lerodea eufala eufala*	(Edwards, 1869)	VVSP	generalist	2010
141	*Levina levina*	(Plötz, 1884)	City and VVSP	forest	1990
142	*Libra aligula decia*	(Hayward, 1942)	City and VVSP	forest	1992
143	*Libra anatolica*	(Plötz, 1883)	City and VVSP	forest	2001
144	*Lucida lucia lucia*	(Capronnier, 1874)	City and VVSP	forest	1981
145	*Lucida ranesus*	(Schaus, 1902)	City and VVSP	forest	1967
146	*Lucida schmithi*	(Bell, 1930)	VVSP	forest	2002
147	*Lycas argentea*	(Hewitson, 1866)	City and VVSP	forest	1991
148	*Lychnuchoides ozias ozias*	(Hewitson, 1878)	City	forest	1956
149	*Lychnuchus celsus*	(Fabricius, 1793)	City and VVSP	forest	1971
150	*Miltomiges cinnamomea*	(Herrich-Schäffer, 1869)	City and VVSP	forest	2002
151	*Mnasilus allubita*	(Butler, 1877)	City	forest	1953
152	*Mnasitheus nitra*	Evans, 1955	VVSP	forest	2002
153	*Mnasitheus ritans*	(Schaus, 1902)	City	forest	1967
154	*Nastra chao*	(Mabille, 1898)	VVSP	open areas	2010
155	*Nastra lurida*	(Herrich-Schäffer, 1869)	VVSP	forest	2002
156	*Nastra* sp.		VVSP	open areas	1989
157	*Neoxeniades scipio scipio*	(Fabricius, 1793)	City	forest	1958
158	*Niconiades caeso*	(Mabille, 1891)	City	forest	1949
159	*Niconiades merenda*	(Mabille, 1878)	City and VVSP	forest	1992
160	*Nyctelius nyctelius nyctelius*	(Latreille, [1824])	City	forest	2010
161	*Orses itea*	(Swainson, 1821)	City	forest	1958
162	*Orthos orthos hyalinus*	(Bell, 1930)	VVSP	forest	2002
163	*Panoquina lucas lucas*	(Fabricius, 1793)	VVSP	forest	1967
164	*Panoquina ocola ocola*	(Edwards, 1863)	VVSP	forest	1987
165	*Papias* sp.		VVSP	forest	2002
166	*Paracarystus evansi*	Hayward, 1938	City	forest	1990
167	*Penicula roppai*	Mielke, 1980	City	forest	1990
168	*Perichares lotus*	(Butler, 1870)	City	forest	1947
169	*Perichares philetes aurina*	Evans, 1955	VVSP	forest	2001

Continue

Table I. Continued.

	Species	Author	Localitiy	Habitat Preference	Last Record
170	*Phanes rezia*	(Plötz, 1882)	City	forest	1967
171	*Phemiades pohli pohli*	(Bell, 1932)	City	forest	1990
172	*Pheraeus argynnis*	(Plötz, 1884)	City	forest	1990
173	*Pheraeus odilia odilia*	(Plötz, 1884)	City	forest	1990
174	*Pheraeus perpulcher*	(Hayward, 1934)	City	forest	1990
175	*Phlebodes sameda*	(Herrich-Schäffer, 1869)	VVSP	forest	1971
176	*Polites vibex catilina*	(Plötz, 1886)	City and VVSP	generalist	1987
177	*Pompeius amblyspila*	(Mabille, 1898)	VVSP	generalist	2002
178	*Pompeius dares*	(Plötz, 1883)	VVSP	open areas	2010
179	*Pompeius pompeius*	(Latreille, [1824])	City	generalist	2010
180	*Pompeius* sp. 1		VVSP	open areas	1967
181	*Pompeius* sp. 2		VVSP	open areas	1973
182	*Psoralis stacara*	(Schaus, 1902)	City and VVSP	forest	1983
183	*Pyrrhopygopsis socrates socrates*	(Ménétriés, 1855)	City	forest	1956
184	*Quinta cannae*	(Herrich-Schäffer, 1869)	City	forest	1959
185	*Saniba sabina*	(Plötz, 1882)	City	forest	1990
186	*Saturnus saturnus servus*	Evans, 1955	VVSP	forest	2001
187	*Sodalia coler*	(Schaus, 1902)	City and VVSP	forest	2002
188	*Sucova sucova*	(Schaus, 1902)	City	forest	2010
189	*Synale elana elana*	(Plötz, 1882)	City and VVSP	open areas	1980
190	*Synale hylaspes*	(Stoll, 1781)	City and VVSP	open areas	1959
191	*Synale metella*	(Plötz, 1882)	VVSP	open areas	1973
192	*Thargella evansi*	Biezanko & Mielke, 1973	VVSP	forest	2002
193	*Thespieus dalman*	(Latreille, [1824])	City	forest	2007
194	*Thespieus haywardi*	Evans, 1937	City	open areas	1947
195	*Thespieus homochromus*	Mielke, 1978	VVSP	open areas	1967
196	*Thespieus lutetia*	(Hewitson, 1866)	City and VVSP	forest	2001
197	*Thespieus xarina*	Hayward, 1948	City and VVSP	open areas	2010
198	*Thoon circellata*	(Plötz, 1882)	City and VVSP	forest	2002
199	*Tigasis fusca*	(Hayward, 1940)	VVSP	forest	2001
200	*Tisias lesueur lesueur*	(Latreille, [1824])	City	forest	1990
201	*Vehilius celeus vetus*	Mielke, 1969	VVSP	open areas	2002
202	*Vehilius clavicula*	(Plötz, 1884)	City and VVSP	forest	1967
203	*Vehilius inca*	(Scudder, 1872)	VVSP	open areas	2002
204	*Vettius artona*	(Hewitson, 1868)	VVSP	forest	2002
205	*Vettius diana diana*	(Plötz, 1886)	VVSP	forest	1971
206	*Vettius diversa diversa*	(Herrich-Schäffer, 1869)	City and VVSP	forest	2010
207	*Vettius fuldai*	(Bell, 1930)	VVSP	forest	1991
208	*Vidius fido*	Evans, 1955	VVSP	open areas	2010
209	*Vidius mictra*	Evans, 1955	VVSP	open areas	2002
210	*Vidius nappa*	Evans, 1955	VVSP	open areas	1967
211	*Vidius nostra nostra*	Evans, 1955	VVSP	open areas	1972
212	*Vidius ochraceus*	Mielke, 1980	VVSP	open areas	1967
213	*Vidius similis*	Mielke, 1980	VVSP	open areas	1991
214	*Vidius* sp.1		VVSP	open areas	2002
215	*Vidius* sp.2		VVSP	open areas	1980
216	*Vidius vidius*	(Mabille, 1891)	VVSP	open areas	2010
217	*Vinius letis*	(Plötz, 1883)	City and VVSP	forest	1987
218	*Vinius pulcherrimus*	Hayward, 1934	VVSP	forest	1984
219	*Virga riparia*	Mielke, 1969	VVSP	open areas	1968
220	*Xeniades chalestra corna*	Evans, 1955	City	open areas	1946
221	*Xeniades orchamus orchamus*	(Cramer, 1777)	City	forest	1990
222	*Zariaspes mys*	(Hübner, [1808])	City and VVSP	forest	1992
223	*Zenis jebus jebus*	(Plötz, 1882)	City and VVSP	forest	2010
224	*Zenis minos*	(Latreille, [1824])	VVSP	forest	2001
	Heteropterinae				
225	*Dardarina castra*	Evans, 1955	VVSP	open areas	2001

which will help in the identification of its biodiversity and its biological peculiarities, it becomes necessary to inventory the Hesperiidae species within other grasslands ecosystems in Brazil, especially the Cerrado enclaves in the states of Paraná and São Paulo, in order to better understand the mainly factors affecting its species distributions.

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