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ARTICLE

New records of chewing lice (Insecta: Phthiraptera) parasites of Brazilian Anhimidae, Threskiornithidae, and Aramidae (Aves)

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Abstract. We present records of chewing lice collected from bird skins of the families Anhimidae, Threskiornithidae, and Aramidae deposited at the Museum of Zoology of University of São Paulo (MZUSP). Twenty-one chewing lice species from the suborders Amblycera and Ischnocera were identified, seven of which are new records for Brazil. These species belong to the genera *Ardeicola* (1), *Colpocephalum* (3), *Ibidoecus* (1), and *Plegadiphilus* (2). Furthermore, ten species were recorded from new localities in Brazil, and *Colpocephalum cayennensis* Price & Emerson, 1967 is for the first time recorded with precise locality in the country. Lastly, the bird host subspecies *Phimosus infuscatus nudifrons* (Spix, 1825) (Threskiornithidae) was for the first time found to harbor lice species.

Keywords. Ibises; Limpkins; Louse; Screamers; Spoonbills.

INTRODUCTION

The order Phthiraptera (chewing and sucking lice) consists of approximately 5,000 valid species (Price *et al.,* 2003), that are permanent ectoparasites of mammals and birds (Johnson & Clayton, 2003; Grimaldi & Engel, 2005). Phthiraptera is divided into four suborders: Amblycera, Ischnocera, Rhynchophthirina, and Anoplura, of which only Amblycera and Ischnocera occur on birds (Price *et al.,* 2003). Among the 25 families that constitute the order Phthiraptera, more than 75% of the diversity belongs to the families Menoponidae (suborder Amblycera) and Philopteridae (suborder Ischnocera) with 1,039 and 2,698 described species, respectively (Johnson & Clayton, 2003). Recently efforts have been made to build the Brazilian faunal list. So far, 148 species of Menoponidae and 190 species of Philopteridae have been recorded (Valim & Kuabara, 2022).

This group of ectoparasites is still very poorly studied in Brazil, and many of the expectedly common species have still not been formally recorded. Even though Brazil has one of the richest avifauna in the world, only a tiny fraction of the number of chewing lice that occur in the country have been recorded and/or described. One of the largest surveys of these ectoparasites for Brazil was made by Kuabara & Valim (2017), that recorded 20% of the total fauna for bird lice in the country and reported 34 species new to Brazil (Valim & Kuabara, 2022). Focusing on this disparity, we collected and analyzed samples of chewing lice from museum bird skins of the families Anhimidae (order Anseriformes), Threskiornithidae (order Pelecaniformes), and Aramidae (order Gruiformes). These records increase what is known about avian chewing lice diversity in Brazil as argued by Oniki (2002), that claims that bird collections provide an unique opportunity for collecting ectoparasites from historical specimens.

Much of the knowledge about these parasitic insects in Brazil must be credited to Lindolpho Rocha Guimarães (1908-1998), who was active between the years 1930-1980 and described more than 70 species (Arzua & Valim, 2010).

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Nevertheless, only a couple publications provided faunal surveys in Brazil; Oniki (1990, 1999) for Amazonas state with twenty louse species from seventeen bird host species, and Mato Grosso state, with sixty-one louse species from thirty-eight bird host species. For Pernambuco state, Roda & Farias (1999) registered fifteen louse species on fifteen bird species; de Lyra-Neves *et al.* (2000, 2005), collected a total of eighty-nine louse specimens from nine bird hosts, but did not identify the louse to species level. Freitas *et al.* (2002), recorded amblyceran s (Menoponidae and Ricinidae) from three bird hosts. Valim *et al.* (2004, 2005) recorded three louse species from one mammal host in Rio de Janeiro state, and twenty-eight louse species in twenty-three bird host species in São Paulo state. Lastly Kuabara & Valim (2017) recorded one hundred and nine louse species from sixty-eight bird host species for Espírito Santo, Goiás, Mato Grosso, and Pará states.

MATERIAL AND METHODS

All bird skin specimens from the families Anhimidae (two species), Threskiornithidae (eight species), and Aramidae (one species) occur in Brazil (Pacheco *et al.,* 2021), and were examined for chewing lice (Table 1). Louse specimens were obtained using the method outlined in Mey (2002), which, for large-bodied hosts, consists of ruffling the fingertips among the body and wing feathers of the specimen, dislodging the lice, which then fall on a white surface (*e.g.,* paper sheet), and are collected in 70% ethanol. Louse specimens were then mounted in a permanent slide following Palma's (1978) protocol.

Collecting ectoparasites from museum skins has a high risk of contamination because lice can be transferred from one host to another by placing the host skins in the same museum tray (Mey, 2002). Also, contaminants are found in a low number. Therefore, identified contaminants (two specimens) were discarded and only specimens that were truly attributable to the host or whose presence was to-be-expected were further considered. All examined material (both lice and birds) are deposited in the ectoparasitological and ornithological collections at the Museum of Zoology of the University de São Paulo (MZUSP), respectively.

Louse specimens were morphologically identified using the available literature for each genus or species, and the cited references are listed under a short paragraph about each louse genus. For each species account, the first line provides the name, authorship, and the figure number of the species. The second line describes the world distribution of the species, then the distribution in Brazil, followed by the host(s) species in which the louse species was previously recorded. Subsequently, the specimen list, counting the number and sex of specimens, louse voucher number, host name, host voucher number, locality, collection date, and collector is cited. Lice nomenclature follows Price *et al.* (2003). Sampling locations were gathered from the original label of each species with coordinates and additional locality information obtained and/or cross-referenced in Paynter & Traylor (1991). Abbreviations of Brazilian State names used herein are as follows: BA, Bahia; GO, Goiás; MA, Maranhão; MS, Mato Grosso do Sul; MT, Mato Grosso; PA, Pará; PR, Paraná; RS, Rio Grande do Sul; SC, Santa Catarina; and SP, São Paulo.

RESULTS

In total, we examined 10 host species and 45 bird skins. Lice were collected from 9 bird species, consisting of 21 bird skins (Table 1). The species that yielded a louse-negative result were *Eudocimus ruber* (Linnaeus, 1758), and *Cercibis oxycerca* (Spix, 1825), the latter on account of not having skins at MZUSP. Both of avian hosts are Threskiornithidae.

Order PHTHIRAPTERA Haeckel, 1896
Suborder AMBLYCERA Kellogg, 1896
Family MENOPONIDAE Mjöberg, 1910

Colpocephalum Nitzsch, 1818

Species in this genus are typical ectoparasites of 15 bird orders (Accipitriformes, Cariamiformes, Cathartiformes, Ciconiiformes, Columbiformes, Cuculiformes, Falconiformes, Galliformes, Gruiformes, Passeriformes, Pelecaniformes, Phoenicopteriformes, Piciformes, Psittaciformes, and Strigiformes, *sensu* Pacheco *et al.,* 2021). This large assemblage is a distinct group of species, considered here as *Colpocephalum* s.l., has 136 valid species (Price *et al.,* 2003; Mey, 2013). For a detailed taxonomic review of the species parasitic on Threskiornithidae see Price & Beer (1965).

Colpocephalum ajajae Ewing, 1930: 126 (Fig. 1A)

Distribution: Argentina, Brazil (present study), Guyana, Panama, USA.

Distribution in Brazil: RS, SP (present study).

Host: *Platalea ajaja* Linnaeus, 1758 (type host) (Threskiornithidae).

Material examined: 1♂ (#7148) ex *Platalea ajaja* (#14955), Tabatinguara (25°01′S, 47°57′W), Cananéia, São Paulo, Brazil, 20.IX.1934, C. Camargo col. 1♀1N (#7149-50) ex *P. ajaja* (#9106), Rio Grande do Sul, Brazil, no further data.

Colpocephalum cayennensis Price & Emerson, 1967: 875 (Fig. 1B)

Distribution: Argentina, Brazil, Colombia.

Table 1. Host-parasite list for species of chewing lice found on museum bird skins in the families Anhimidae (Anseriformes), Threskiornithidae (Pelecaniformes), and Aramidae (Gruiformes), in Brazil. * New Brazilian locality record; ** First Brazilian record; *** First Brazilian record with precise locality information.

Host Order	Host Family	Host Species	Host common name (in English/Portuguese)	Number of host skins examined	Number of host skins with lice	Louse species	Number of lice collected		
							Males	Females	Nymphs
Anseriformes	Anhimidae	*Anhima cornuta* (Linnaeus, 1766)	Horned Screamer/Anhuma	2	2	*Dicteisia abdominalis* (Menoponidae)	3	1	1
						Dicteisia palamedea (Menoponidae)	11	5	3
						Bothriometopus macrocnemis (Philopteridae)	1	1	10
		Chauna torquata (Oken, 1816)	Southern Screamer/Tachã	3	2	*Dicteisia keleri* (Menoponidae)	1	0	0
						*Bothriometopus macrocnemis** (Philopteridae)	0	1	3
Pelecaniformes	Threskiornithidae	*Cercibis oxycerca* (Spix, 1825)	Sharp-tailed Ibis/Trombeteiro	0	0	—	—	—	—
		Eudocimus ruber (Linnaeus, 1758)	Scarlet Ibis/Guará	6	0	—	—	—	—
		Mesembrinibis cayennensis (Gmelin, 1789)	Green Ibis/Coró-coró	3	2	*Colpocephalum cayennensis**** (Menoponidae)	1	2	0
		Phimosus infuscatus nudifrons (Spix, 1825)	Whispering Ibis/Tapicuru	4	4	*Colpocephalum infuscati** (Menoponidae)	3	2	1
						*Plegadiphilus riograndensis** (Menoponidae)	0	1	1
						*Ardeicola praegracilis** (Philopteridae)	2	2	2
						*Ibidoecus phimosus** (Philopteridae)	0	1	1
		Platalea ajaja Linnaeus, 1758	Roseate Spoonbill/Colhereiro	6	1	*Colpocephalum ajajae*** (Menoponidae)	1	1	1
						*Ibidoecus iberoamericanus** (Philopteridae)	1	3	4
		Plegadis chihi (Vieillot, 1817)	White-faced Ibis/Caraúna	5	3	*Colpocephalum leptopygos** (Menoponidae)	0	1	0
						*Plegadiphilus plegadis*** (Menoponidae)	3	0	2
						*Ardeicola rhaphidius** (Philopteridae)	2	1	2
		Theristicus caerulescens (Vieillot, 1817)	Plumbeous Ibis/Curicaca-real	5	3	*Colpocephalum harpiprioni*** (Menoponidae)	3	4	0
						*Ardeicola meinertzhageni*** (Philopteridae)	9	1	4
		Theristicus caudatus (Boddaert, 1783)	Buff-necked Ibis/Curicaca	7	2	*Colpocephalum trispinum*** (Menoponidae)	8	7	0
						*Plegadiphilus mamillatus*** (Menoponidae)	0	1	0
						Ardeicola theristicus (Philopteridae)	9	7	16
						*Ibidoecus heterogenitalis*** (Philopteridae)	1	0	0
Gruiformes	Aramidae	*Aramus guarauna* (Linnaeus, 1766)	Limpkin/Carão	4	2	*Rallicola funebris** (Philopteridae)	0	6	0

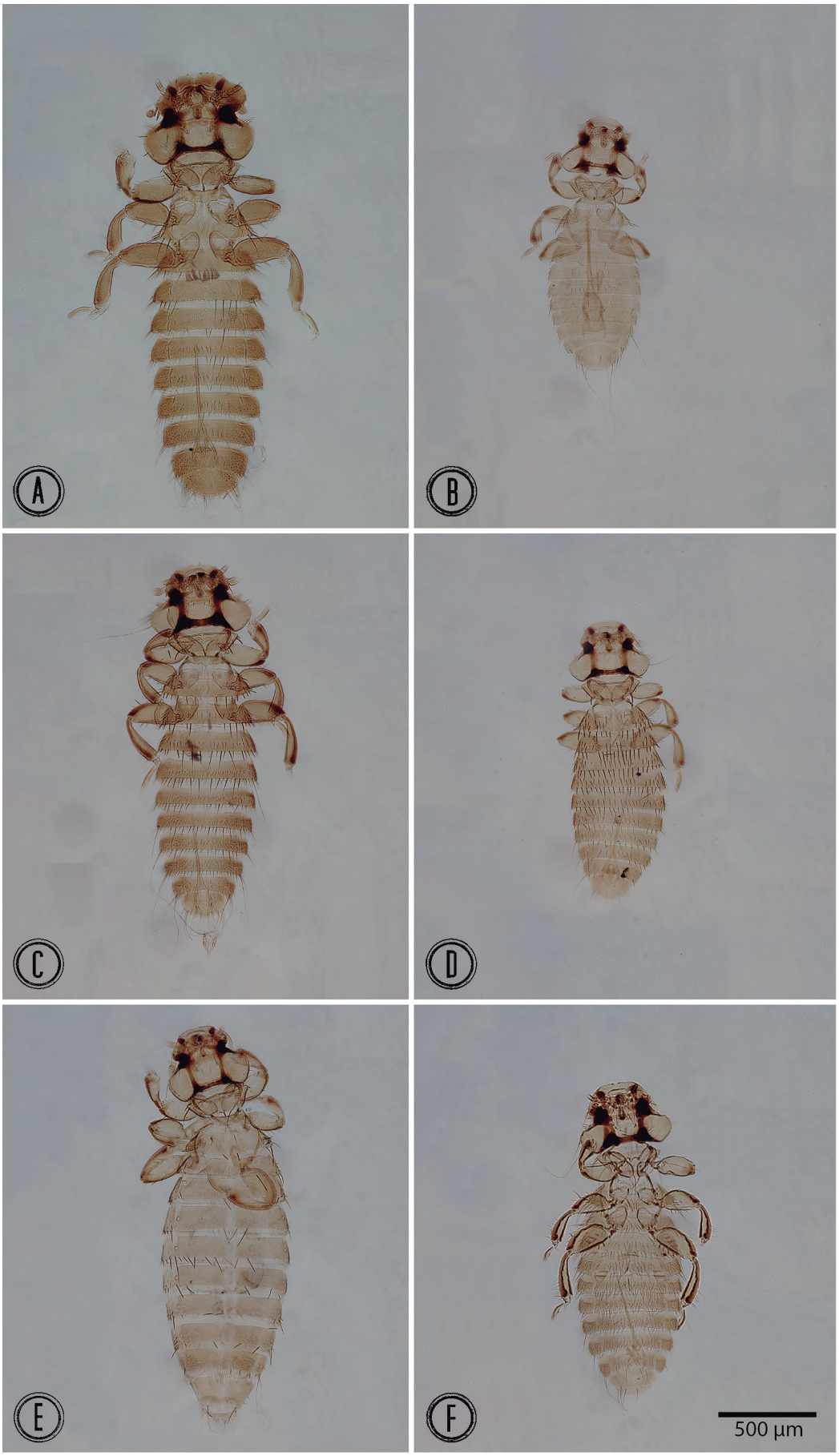

Figure 1. Habitus in most dorsal view: A = *Colpocephalum ajajae* male (note a dilatation of pre-ocular region on right side of specimen as result of a teratology); B = *Colpocephalum cayennensis* male; C = *Colpocephalum harpiprioni* male; D = *Colpocephalum infuscati* male; E = *Colpocephalum leptopygos* female; F = *Colpocephalum trispinum* male. All photos are in same scale.

Distribution in Brazil: no further data (Price & Emerson, 1967), GO, PA (present study).

Host: *Mesembrinibis cayennensis* (Gmelin, 1789) (type host) (Threskiornithidae).

Material examined: 1♂1♀ (#7145-46) ex *Mesembrinibis cayennensis* (#30659), Rio Aricá, Fazenda Aricá (Expedição ao Alto Tapajós) (17°57′S, 55°56′W), Aruanã, Goiás, Brazil, 26.VI.1944, A.M. Olalla col. 1♀ (#7147) ex *M. cayennensis* (#58046), Rio Tapajós (03°40′S, 55°30′W), Fordlândia, Pará, Brazil, 10.XI.1964, A.M. Olalla col.

Colpocephalum harpiprioni Price & Beer, 1965: 118 (Fig. 1C)

Distribution: Argentina, Brazil (present study).

Distribution in Brazil: MT (present study).

Host: *Theristicus caerulescens* (Vieillot, 1817) (type host) (Threskiornithidae).

Material examined: 1♂4♀ (#7155-56) ex *Theristicus caerulescens* (#79231), Fazenda Descalvados (16°42′35″S, 57°44′55″W), Cáceres, Mato Grosso, Brazil, 04.IX.2007, L.F. Silveira col. 2♂ (#7157-58) ex *T. caerulescens* (#98503), Vila Bela da Santíssima Trindade (14°59′15.4″S, 59°55′10.6″W), Mato Grosso, Brazil, 17.II.2014, L.F. Silveira col.

Colpocephalum infuscati Price & Emerson, 1967: 877 (Fig. 1D)

Distribution: Argentina, Brazil, Colombia.

Distribution in Brazil: BA, PA (present study), CE (Price & Emerson, 1967), RS (Valim *et al.,* 2009).

Host: *Phimosus infuscatus* (Lichtenstein, 1823) (type host) (Threskiornithidae).

Material examined: 1♂ (#7164) ex *Phimosus infuscatus nudifrons* (#40753), Rio Preto (11°21′S, 43°52′W), Santa Rita de Cássia, Bahia, Brazil, 28.III.1958, E. Dente col. 1♂2♀1N (#7162-63) ex *P. i. nudifrons* (#97035), Barra das Princesas, Fazenda Fartura (09°47′S, 50°12′W), Santana do Araguaia, Pará, Brazil, 15.VIII.2013, L.F. Silveira col. 1♂, 1N (#7160-61) ex *P. i. nudifrons* (#83734), Fazenda Fartura (09°42′S, 50°24′W), Santana do Araguaia, Pará, Brazil, 03.IX.2009, L.F. Silveira col.

Colpocephalum leptopygos Nitzsch [in Giebel], 1874: 273 (Fig. 1E)

Distribution: Argentina, Brazil, Russia, USA.

Distribution in Brazil: SC (Eichler, 1954), SP (present study).

Hosts: *Plegadis chihi* (Vieillot, 1817), *P. falcinellus* (Linnaeus, 1766) (type host), *P. ridgwayi* (Allen, 1876) (Threskiornithidae).

Material examined: 1♀ (#7159) ex *Plegadis chihi* (#9792), Rio Pinheiros (23°32′S, 46°44′W), São Paulo, São Paulo, Brazil, III.1906, J. Florencio col.

Colpocephalum trispinum Piaget, 1885: 122 (Fig. 1F)

Distribution: Brazil (present study), Chile, Ecuador.

Distribution in Brazil: SC, MS (present study).

Hosts: *Theristicus caudatus* (Boddaert, 1783) (type host), *T. melanopis* (Gmelin, 1789) (Threskiornithidae).

Material examined: 4♂1♀ (#7151-52) ex *Theristicus caudatus* (#18247), Salobra (20°10′S, 56°31′W, 125 amsl), Miranda, Mato Grosso do Sul, Brazil, 21.VII.1939, Exp. [MZUSP] Mato Grosso col. 2♂ (#7153-54) same data, except ex *T. caudatus* (#18246). 2♂6♀ (#2892-95) ex *T. caudatus,* Escola de Veterinária, Blumenau, Santa Catarina, Brazil, 2001, J.C. Souza Jr col.

Dicteisia Bedford, 1939

Species of this genus are found exclusively on the screamers (Anhimidae) and currently comprise 5 valid species (Price *et al.,* 2003). For a detailed taxonomic review of the genus see Price (1968).

Dicteisia abdominalis Carriker & Díaz-Ungría, 1961: 38 (Fig. 2A)

Distribution: Brazil, Colombia, Ecuador, Paraguay, Venezuela.

Distribution in Brazil: no further data (Price, 1968), "Amazonia" (present study).

Host: *Anhima cornuta* (Linnaeus, 1766) (type host) (Anhimidae).

Material examined: 3♂1♀1N (#7175-79) ex *Anhima cornuta* (#73171), Amazonia, V.1967, no further data.

Dicteisia keleri Price, 1968: 448 (Fig. 2B)

Distribution: Argentina, Brazil, Paraguay.

Distribution in Brazil: MT (Price, 1968; present study), MS (Price, 1968).

Hosts: *Anhima cornuta* (Linnaeus, 1766), *Chauna torquata* (Oken, 1816) (type host) (Anhimidae).

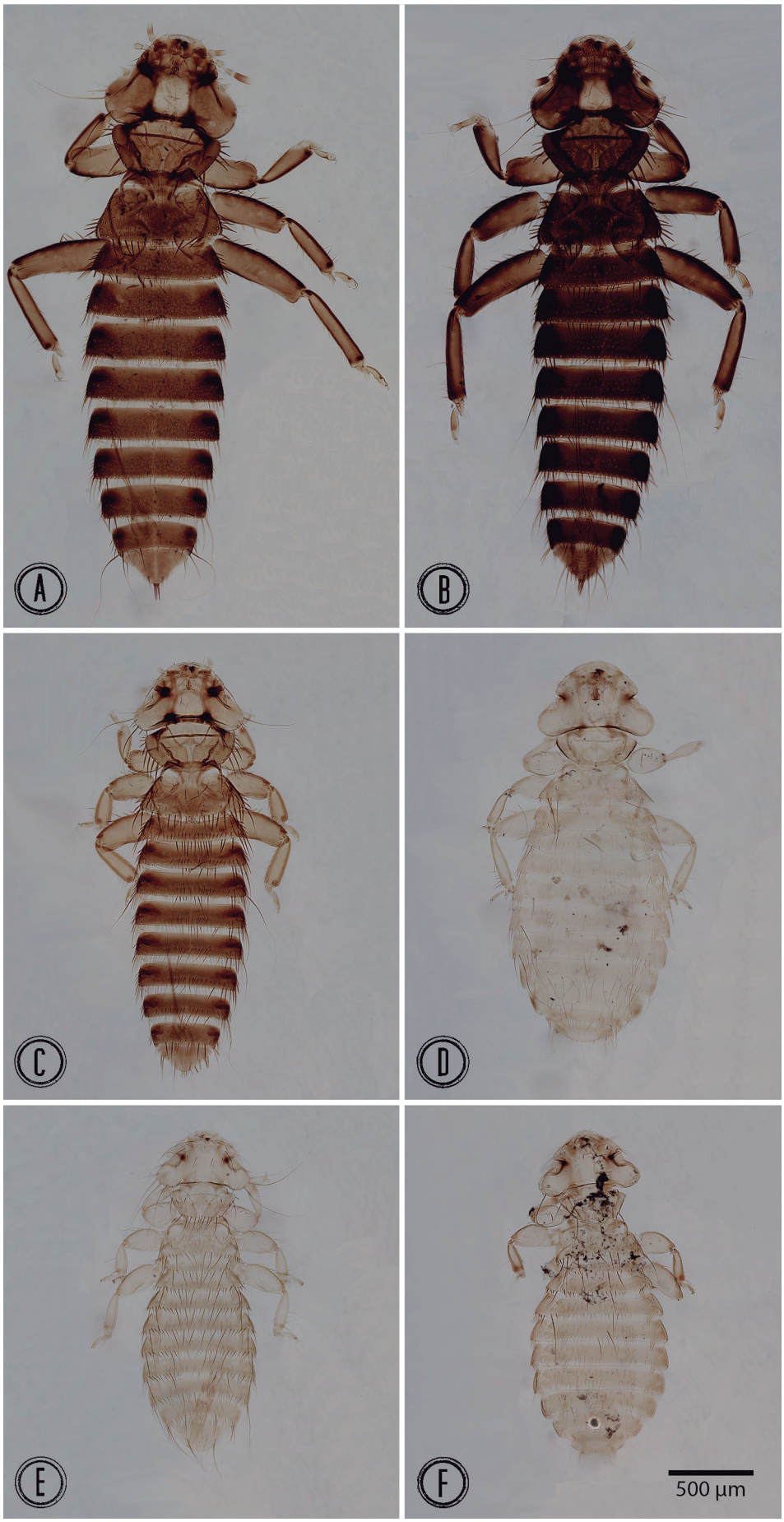

Figure 2. Habitus in most dorsal view: A = *Dicteisia abdominalis* male; B = *Dicteisia keleri* male; C = *Dicteisia palamedae* male; D = *Plegadiphilus mamillatus* female; E = *Plegadiphilus plegadis* male; F = *Plegadiphilus riograndensis* female. All photos are in same scale.

Material examined: 1♂ (#7173) ex *Chauna torquata* (#98649), Rio Guaporé (15°03′01.18″S, 59°05′32.07″W), Vila Bela da Santísima Trindade, Mato Grosso, Brazil, 26.II.2014, L.F. Silveira col.

Dicteisia palamedea Eichler, 1954: 43 (Fig. 2C)

Distribution: Brazil, Colombia, Ecuador, Paraguay, Peru.

Distribution in Brazil: no further data (Price, 1968), "Amazonia" (present study).

Host: *Anhima cornuta* (Linnaeus, 1766) (type host) (Anhimidae).

Material examined: 11♂5♀3N (#7186-7200) ex *Anhima cornuta* (#73171), Amazonia, V.1967, no further data. 3♂2♀1N (#7180-85) ex *A. cornuta* (#24540), Amazonia, 1937, A.M. Olalla col.

Plegadiphilus Bedford, 1939

Species of this genus are found exclusively on ibises (Threskiornithidae) and currently comprise 8 valid species (Price *et al.,* 2003; Valim *et al.,* 2009). For a limited discussion of the genus see Tuff (1965), Emerson & Price (1969), and Ledger (1971).

Plegadiphilus mamillatus (Piaget, 1885: 114) (Fig. 2D)

Distribution: Bolivia, Brazil (present study), Colombia.

Distribution in Brazil: MS (present study).

Host: *Theristicus caudatus* (Boddaert, 1783) (type host) (Threskiornithidae).

Material examined: 1♀ (#7165) ex *Theristicus caudatus* (#18247), Salobra (20°10′S, 56°31′W, 125 amsl), Miranda, Mato Grosso do Sul, Brazil, 21.VII.1939, Exp. [MZUSP] Mato Grosso col.

Plegadiphilus plegadis (Dubinin, 1938: 178) (Fig. 2E)

Distribution: Argentina, Brazil (present study), Russia, USA.

Distribution in Brazil: SP (present study).

Hosts: *Plegadis chihi* (Vieillot, 1817), *P. falcinellus* (Linnaeus, 1766) (type host) (Threskiornithidae).

Material examined: 2♂1N (#7168-70) ex *P. chihi* (#9792), Rio Pinheiros (23°32′S, 46°44′W), São Paulo, Brazil, III.1906, J. Florencio col. 1♂1N (#7166-67) ex *P. chihi* (#9792), Iguape (24°43′S, 47°33′W, msl), São Paulo, Brazil, 20.V.1904, R. Krone col.

Plegadiphilus riograndensis Valim [in Valim *et al.*], 2009: 253 (Fig. 2F)

Distribution: Brazil.

Distribution in Brazil: RS (Valim *et al.,* 2009), PA (present study).

Host: *Phimosus infuscatus* (Lichtenstein, 1823) (type host) (Threskiornithidae).

Material examined: 1♀1N (#7171-72) ex *Phimosus infuscatus nudifrons* (#83734), Fazenda Fartura (09°42′S, 50°24′W), Santana do Araguaia, Pará, Brazil, 03.IX.2009, L.F. Silveira col.

Suborder ISCHNOCERA Kellogg, 1896
Family PHILOPTERIDAE Burmeister, 1838 (*sensu lato*)

Ardeicola Clay, 1936

This genus has a worldwide distribution, and it is found exclusively on Ciconiiformes. Currently the genus comprises 68 described species (Price *et al.,* 2003). For a limited discussion of the genus and identification of Brazilian species see Pessôa & Guimarães (1935a), Carriker (1960), Hajela (1966), Tuff (1967), and Hajela & Tandan (1968).

Ardeicola meinertzhageni Hajela, 1966: 551 (Fig. 3A)

Distribution: Brazil (present study), Paraguay.

Distribution in Brazil: GO, MT, MS (present study).

Host: *Theristicus caerulescens* (Vieillot, 1817) (type host) (Threskiornithidae).

Material examined: 6♂1♀1N (#7234-37) ex *Theristicus caerulescens* (#30657), Rio Aricá, Fazenda Aricá (Expedição ao Alto Tapajós) (17°57′S, 55°56′W), Aruanã, Goiás, Brazil, 21.VI.1944, O. Pinto col. 1♂1N (#7238) ex *T. caerulescens* (#79231), Fazenda Descalvados (16°42′35″S, 57°44′55″W), Cáceres, Mato Grosso, Brazil, 04.IX.2007, L.F. Silveira col. 1♂1N (#7239-40) ex *T. caerulescens* (#98085), Aquidauana, Mato Grosso do Sul, Brazil, 15.VII.1973, G. Baudet col. 1♂1N (#7241-42) ex *T. caerulescens* (#98503), Vila Bela da Santíssima Trindade (14°59′15.4″S, 59°55′10.6″W), Mato Grosso, Brazil, 17.II.2014, L.F. Silveira col.

Ardeicola praegracilis Carriker, 1960: 321 (Fig. 3B)

Distribution: Argentina, Brazil, Colombia.

Distribution in Brazil: RS (Valim *et al.,* 2009), BA, PA (present study).

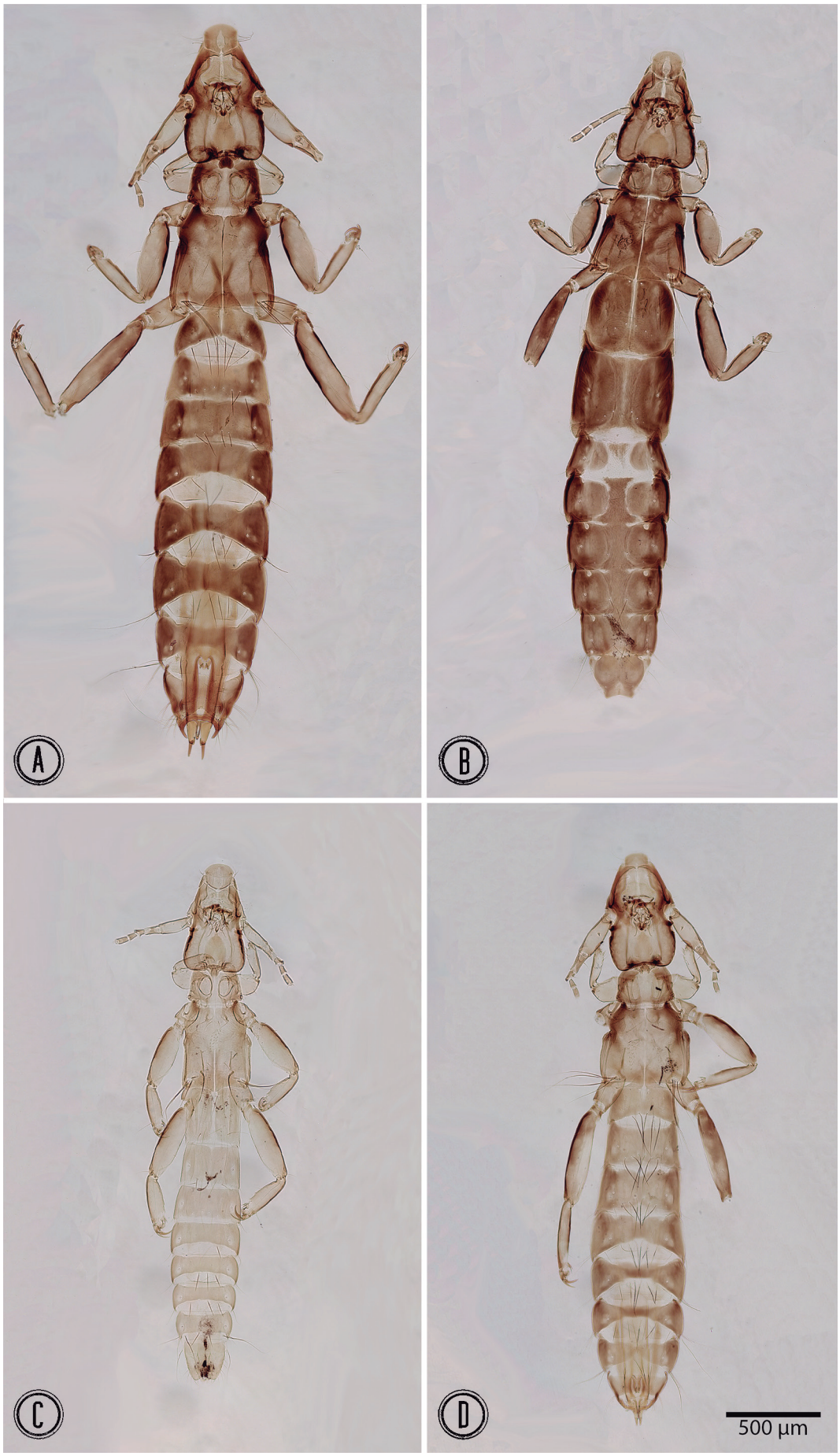

Figure 3. Habitus in most dorsal view: A = *Ardeicola meinertzhageni* male; B = *Ardeicola praegracilis* female; C = *Ardeicola rhaphidius* male; D = *Ardeicola theristicus* male. All photos are in same scale.

Hosts: *Phimosus infuscatus* (Lichtenstein, 1823), *P. i. berlepschi* Hellmayr, 1903 (type host) (Threskiornithidae).

Material examined: 1♂1♀2N (#7248-51) ex *Phimosus infuscatus nudifrons* (#83734), Fazenda Fartura (09°42′S, 50°24′W), Santana do Araguaia, Pará, Brazil, 03.IX.2009, L.F. Silveira col. 1♂1♀ (#7252-53) ex *P. i. nudifrons* (#40753), Rio Preto (11°21′S, 43°52′W), Santa Rita de Cássia, Bahia, Brazil, 28.III.1958, E. Dente col.

Ardeicola rhaphidius (Nitzsch [in Giebel], 1866: 384) (Fig. 3C)

Distribution: Argentina, Brazil, Peru, USA.

Distribution in Brazil: SC (Eichler, 1943; Tuff, 1967), SP (present study).

Hosts: *Plegadis chihi* (Vieillot, 1817), *P. falcinellus* (Linnaeus, 1766) (type host) (Threskiornithidae).

Material examined: 1♂ (#7243) ex *P. chihi* (#9792), Rio Pinheiros (23°32′S, 46°44′W), São Paulo, Brazil, III.1906, J. Florencio col. 1♂ (#7244) ex *P. chihi* (#2152), Iguape (24°43′S, 47°33′W, msl), São Paulo, Brazil, 20.V.1904, R. Krone col. 1♀2N (#7245-47) ex *P. chihi* (#1934), same locality, 30.IV.1901, same collector.

Ardeicola theristicus (Pessôa & Guimarães, 1935a: 311) (Fig. 3D)

Distribution: Brazil.

Distribution in Brazil: MS (Pessôa & Guimarães, 1935a; present study).

Host: *Theristicus caudatus* (Boddaert, 1783) (type host) (Threskiornithidae).

Material examined: 5♂5♀9N (#7218-27) ex *Theristicus caudatus* (#18247), Salobra (20°10′S, 56°31′W, 125 amsl), Miranda, Mato Grosso do Sul, Brazil, 21.VII.1939, Exp. [MZUSP] Mato Grosso col. 4♂2♀7N (#7228-33) same data, except ex *T. caudatus* (#18246).

Bothriometopus Taschenberg, 1882

Species of this genus are found exclusively on the screamers (Anhimidae) and currently comprise 2 described species (Price *et al.,* 2003). For a detailed morphological and ecological discussion of the genus see Cicchino & Mey (2007).

Bothriometopus macrocnemis (Burmeister, 1838: 433) (Fig. 4A)

Distribution: Bolivia, Brazil, Venezuela.

Distribution in Brazil: PR (Cicchino & Mey, 2007), RS (Valim *et al.,* 2009), MS, MT, PA, "Amazonia" (present study).

Hosts: *Anhima cornuta* (Linnaeus, 1766) (type host), *Chauna chavaria* (Linnaeus, 1766), *C. torquata* (Oken, 1816) (Anhimidae).

Material examined: 1♀1N (#7201-02) ex *Chauna torquata* (#98649), Rio Guaporé (15°31′18″S, 59°5′32.07″W), Vila Bela da Santísima Trindade, Mato Grosso, Brazil, 26.II.2014, L.F. Silveira col. 2N (#7207-08) ex *C. torquata* (#10104), Corumbá (19°01′S, 57°39′W), Mato Grosso do Sul, Brazil, IX.1917, E. Garbe col. 1♀4N (#7203-06) ex *Anhima cornuta* (#73171), Amazonia, V.1967, no further data. 6N (#7209-11) ex *A. cornuta* (#24540), Amazonia, 1937, A.M. Olalla col. 1♂ (#7642) ex *A. cornuta* (#97226), Fazenda Fartura (09°50′S, 50°29′W), Santana do Araguaia, Pará, Brazil, VIII.2013, M.P. Valim and L.F. Silveira cols.

Ibidoecus Cummings, 1916

This genus is distributed across the world but is found exclusively on the ibises (Threskiornithidae). It currently comprises 23 valid species (Price *et al.,* 2003). For a review about the Neotropical species see Carriker (1947).

Ibidoecus heterogenitalis Carriker, 1947: 128 (Fig. 4B)

Distribution: Bolivia, Brazil (present study)

Distribution in Brazil: SC (present study).

Host: *Theristicus caudatus* (Boddaert, 1783) (type host).

Material examined: 1♂ (#2891) ex *Theristicus caudatus,* Escola de Veterinária, Blumenau, Santa Catarina, Brazil, 2001, J.C. Souza Jr col.

Ibidoecus iberoamericanus Eichler, 1943: 5 (Fig. 4C)

Distribution: Argentina, Brazil, Colombia.

Distribution in Brazil: PA (Eichler, 1943), MG, SP (present study).

Host: *Platalea ajaja* Linnaeus, 1758 (type host) (Threskiornithidae).

Material examined: 1♀2N (#7212-14) ex *Platalea ajaja* (#2406), Iguape (24°43′S, 47°33′W, msl), São Paulo, Brazil, 10.VII.1893, R. Krone col. 1N (#72115) ex *P. ajaja* (#14955), Tabatinguara (25°01′S, 47°57′W), Cananéia, São Paulo, Brazil, 20.IX.1934, C. Camargo col. 1♂1♀1N (#66-67) ex *P. ajaja,* Tabatinguara (25°01′S, 47°57′W), Cananéia, São Paulo, Brazil, no date, C. Worontzow col. 1♀ (#1501) ex *P. ajaja,* Pirapora, Minas Gerais, Brazil, 1913, E. Garbe col.

***Ibidoecus phimosus* Carriker, 1947: 124 (Fig. 4D)**

Distribution: Argentina, Brazil, Colombia.

Distribution in Brazil: BA (present study), RS (Valim *et al.,* 2009).

Hosts: *Phimosus infuscatus* (Lichtenstein, 1823), *P. i. berlepschi* Hellmayr, 1903 (type host) (Threskiornithidae).

Material examined: 1♀1N (#7216-17) ex *Phimosus infuscatus nudifrons* (#40753), Rio Preto (11°21′S, 43°52′W), Santa Rita de Cássia, Bahia, Brazil, 28.III.1958, E. Dente col.

***Rallicola* Johnston & Harrison, 1911**

Species of this polyphyletic genus (Valim & Weckstein, 2012) occur worldwide and are commonly found on six bird orders (Apterygiformes, Charadriiformes, Cuculiformes, Gruiformes, Passeriformes, and Piciformes, *sensu* CBRO, 2021). Currently, the genus comprises 96 valid species (Price *et al.,* 2003). For identification of the species parasitic on the limpkin see Pessôa & Guimarães (1935b) and Emerson (1955).

***Rallicola funebris* (Nitzsch [in Giebel], 1866: 371) (Fig. 4E)**

Distribution: Argentina, Brazil, Bolivia, Colombia, USA.

Distribution in Brazil: MS (Pessôa & Guimarães, 1935b), SP (present study).

Host: *Aramus guarauna* (Linnaeus, 1766) (type host) (Aramidae).

Material examined: 4♀ (#6366-67) ex *Aramus guarauna* (#93041), Itanhaém (24°11′S, 46°47′W, 3 amsl), São Paulo, Brazil, 17.IX.2011, CETAS São Vicente Team col. 2♀ (#6365) ex *A. guarauna* (#91605), Vila Monteiro Lobato (23°27′25″S, 46°30′06″W), Guarulhos, São Paulo, Brazil, 12.IV.2010, Zoo Guarulhos col.

DISCUSSION

Scientific collections have proved to be a great source for new discoveries and an inexhaustible source for morphological, molecular, and biogeographic data (Funk, 2018; de Vivo *et al.,* 2014). The material deposited at museums represents an endless source of knowledge about biodiversity, so the specimens must be treated as unique and irreplaceable. The revision of scientific material brings not only new data and even new species, but also has a terrific potential to discover new or historical localities (Serrano-Villavicencio & Silveira, 2019).

Mey (2002) attests that studies using bird skins have not been established by museums to later examine the specimens for the occurrence of ectoparasites. Nevertheless, it is worth noting that the material obtained through this method serves as an invaluable and efficient resource, considering the scarcity and challenges associated with acquiring bird specimens. It helps to elucidate our current knowledge about the occurrence and distribution of chewing lice that parasitize birds worldwide. Chewing lice typically exhibit a strong preference for specific hosts, and the significance of bird collections extends beyond ornithology. These collections play a crucial role in exploring the the relationship between hosts and their parasites, as well biogeography, and co-evolution (*e.g.,* Sweet *et al.,* 2016, Catanach *et al.,* 2019). The technique of shaking out skins (ruffling), remains as an effective way of studying the diversity of these host-specific insects. It is a simple and cheap method, requiring a plastic bag, a curved point needle, and a white surface (*e.g.,* paper sheet) to collect the parasites. However, we cannot dismiss a disadvantage of this method using museum specimens, which is possible feather loss that can damage the specimens and erroneous records due to contamination (Clayton & Drown, 2001; Mey, 2002).

Here we report twenty-one chewing lice species from two separate families, Menoponidae (Amblycera) and Philopteridae (Ischnocera), found on nine bird species: *Anhima cornuta, Chauna torquata* (Anhimidae), *Plegadis chihi, Mesembrinibis cayennensis, Phimosus infuscatus nudifrons, Theristicus caerulescens, T. caudatus, Platalea ajaja* (Threskiornithidae), and *Aramus guarauna* (Aramidae). All species of chewing lice were recorded from their regular hosts (Price *et al.,* 2003), except for the subspecies *Phimosus infuscatus nudifrons,* which is recorded for the first time harboring four chewing lice species that were previously only recorded on either *P. infuscatus* ssp. or *P. i. berlepschi.* Many novel geographical records were made.

Seven species are reported for the first time in Brazil: *Colpocephalum ajajae, C. harpiprioni, C. trispinum, Plegadiphilus mamillatus, P. plegadis* (Amblycera, Menoponidae), *Ibidoecus heterogenitalis, Ardeicola meinertzhageni* (Ischnocera, Philopteridae). Another ten species were recorded from new localities in Brazil: *Colpocephalum infuscati* (Price & Emerson, 1967; Valim *et al.,* 2009), *C. leptopygos* (Eichler, 1954), *Plegadiphilus riograndensis* (Valim *et al.,* 2009) (Menoponidae), *Ardeicola praegracilis* (Valim *et al.,* 2009), *A. rhaphidius* (Eichler, 1943; Tuff, 1967), *Bothriometopus macrocnemis* (Cicchino & Mey, 2007; Valim *et al.,* 2009), *Ibidoecus iberoamericanus* (Eichler, 1943), *I. phimosus* (Valim *et al.,* 2009), and *Rallicola funebris* (Pessôa & Guimarães, 1935b). This is also the first time that more precise locality information is given for *Colpocephalum cayennensis;* previously recorded only as 'Brazil' (Price & Emerson, 1967). Herein this species is recorded from Pará and Goiás states.

Faunal inventory studies provide access to a diversity of a determined locality or biome in a certain time and space (Silveira *et al.,* 2010). This study provided new information about chewing lice diversity and abundance in

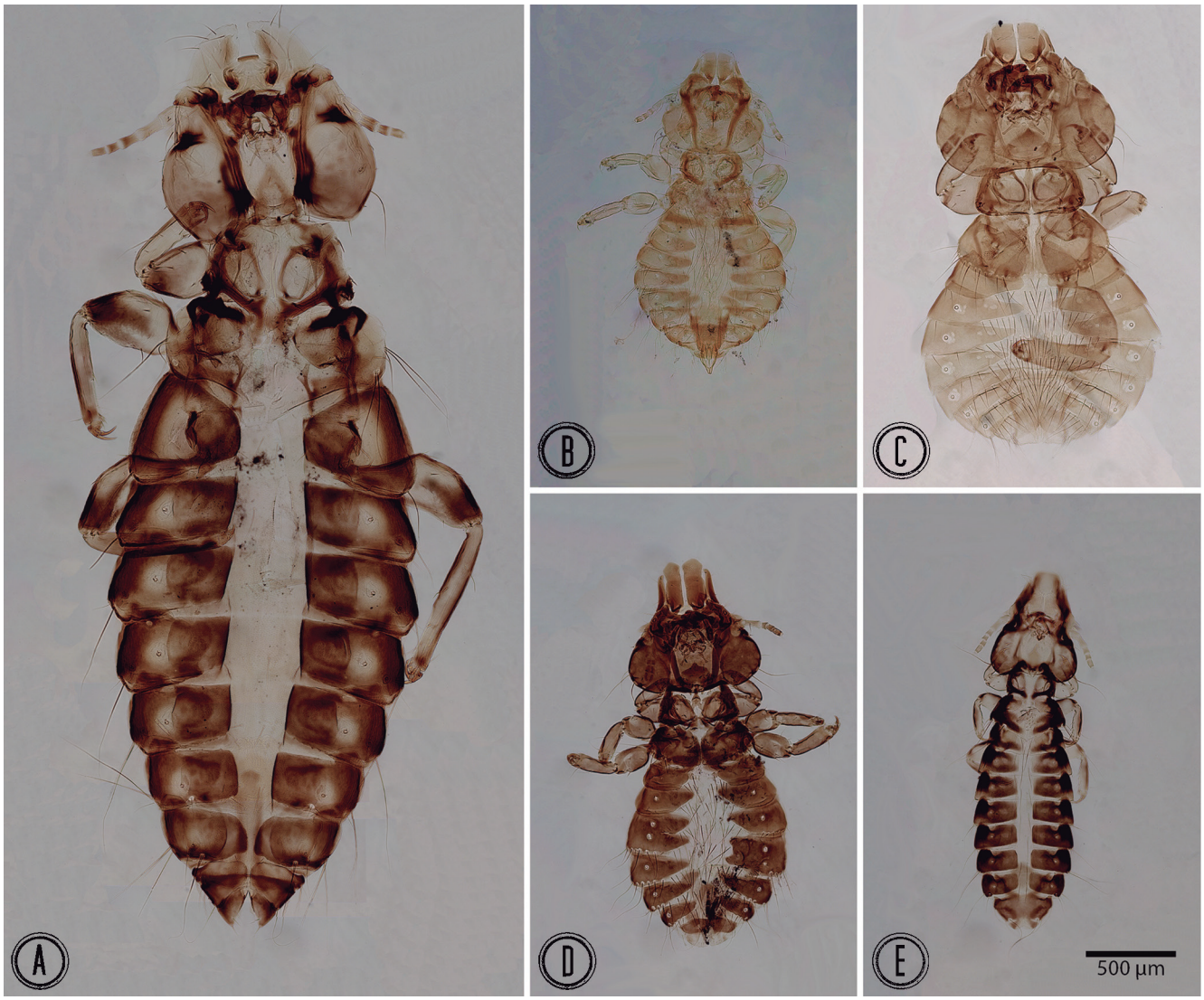

Figure 4. Habitus in most dorsal view: A = *Bothriometopus macrocnemis* female; B = *Ibidoecus heterogenitalis* male; C = *Ibidoecus iberoamericanus* female; D = *Ibidoecus phimosus* female (note a fusion of tergopleurites IV+V on left and V+VI on right side of specimen as result of a teratology); E = *Rallicola funebris* female. All photos are in same scale.

four Brazilian biomes, Amazon, Atlantic Forest, Cerrado, and Pantanal. It also sheds a light on the importance of museum collections, previously pointed out by Oniki (2002) and Mey (2002), as a methodological way to reduce the gap between the bird fauna in Brazil, with almost two thousand bird species recorded (CBRO, 2021), and the 438 bird lice species records in Brazil (Valim & Kuabara, 2022). After the present report, this number will reach exactly 445 species of bird lice recorded so far in Brazil.

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