

Anna Ferraroni

**Taxonomia e filogenia de *Aratinga* Spix, 1824
(Aves: Psittacidae)**

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São Paulo
2015

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Dissertação apresentada ao Instituto de Biociências da Universidade de São Paulo, para a obtenção de Título de Doutor em Zoologia.

Orientador: Dr. Luís Fabio Silveira

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*À minha família,
que sempre me apoia e acredita nos meus sonhos*

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Índice

Introdução geral	1
Referências bibliográficas	6

Capítulo 1. Morphology, plumage variation and taxonomy of the representatives of the genus *Aratinga* Spix, 1824 (Aves: Psittacidae)

Abstract.....	10
Resumo.....	11
Introduction.....	12
Materials and methods.....	13
Results and discussion.....	15
Literature cited.....	30
Appendices.....	33

Capítulo 2. Morphology, plumage variation and taxonomy of the representatives of the genus *Eupsittula* Bonaparte, 1853 (Aves: Psittacidae)

Abstract.....	50
Resumo.....	51
Introduction.....	52
Materials and methods.....	53
Results and discussion.....	55
Literature cited.....	90
Appendices.....	94

Capítulo 3. Morphology, plumage variation and taxonomy of the representatives of the genus *Thectocercus* Ridgway, 1912 (Aves: Psittacidae)

Abstract.....	140
Resumo.....	141
Introduction.....	142
Materials and methods.....	144
Results and discussion.....	146
Literature cited.....	156
Appendices.....	159

Capítulo 4. Morphology, plumage variation and taxonomy of the representatives of the genus *Psittacara* Vigors, 1825 (Aves: Psittacidae)

Abstract.....	174
Resumo.....	175
Introduction.....	176
Materials and methods.....	178
Results and discussion.....	180
Literature cited.....	207
Appendices.....	211

Capítulo 5. Morphology-based phylogeny supports splitting of the genus *Aratinga* Spix, 1824 (Aves: Psittacidae)

Abstract.....	246
Resumo.....	247
Introduction.....	248
Materials and methods.....	250

Results and discussion.....	253
Conclusions.....	265
Literature cited.....	265
Appendices.....	271
Conclusões gerais.....	386
Referências bibliográficas.....	386
General abstract.....	388
Resumo geral.....	389

Introdução geral

Desde a antiguidade, os psittacídeos têm chamado a atenção dos homens, principalmente pela plumagem colorida. O registro mais antigo de papagaios como animais de estimação pode ser encontrado na obra de Ctesias, um físico grego que serviu na corte de Artaxerxes II da Pérsia em torno de 398 a.c. (Cameron 2012). Além da plumagem, a popularidade dos psittacídeos deve-se à sua natureza social, em particular, a capacidade de usar palavras humanas, característica que garantiu-lhes destaque na mitologia, literatura e cultura popular.

Os psittacídeos pertencem à ordem Psittaciformes, um dos grupos mais ricos em espécies de aves não-passeriformes com aproximadamente 353 espécies atualmente reconhecidas (Rowley 1997; Astuti *et al.* 2006; Schweizer *et al.* 2010), que ocorrem na maioria das regiões tropicais e subtropicais. As relações dentro da ordem estão longe de serem resolvidas. Vários autores, com base em caracteres morfológicos (Garrod 1874; Beddard 1898; Collar 1997; de Kloet & de Kloet 2005; Wright *et al.* 2008) e moleculares (Ericson *et al.* 2006), reconhecem duas famílias: Cacatuidae e Psittacidae. Enquanto Joseph *et al.* (2012), utilizando dados moleculares, paleontológicos e morfológicos, dividiram a ordem em três superfamílias (Strigopoidea, Cacatuoidea e Psittacoidea), que incluem seis famílias: Strigopoidae, Nestoridae, Cacatuidae, Psittichasidae, Psittacidae e Psittaculidae. Além disso, uma redução para quatro famílias (Strigopidae, Cacatuidae, Psittacidae e Psittaculidae) foi recentemente proposta por Cracraft (2013).

Dentro da família Psittacidae, a maioria dos autores (de Kloet & de Kloet 2005; Astuti *et al.* 2006) reconhecem duas subfamílias principais: Psittacinae (incluindo os papagaios típicos) e Loriinae (compreendendo loris e afins). Dentro de Psittacinae, nove tribos foram propostas (Forshaw 1989; Collar 1997; Tavares *et al.* 2006), sendo elas: Psittacini (África), Arini (Neotropical), Platycerini (Austrália, Nova Zelândia e Nova Caledônia), Psittaculini (Austrália e África), Psittichadini (Nova Guiné), Ciclopsittacini (Austrália e Nova Guiné), Micropsittini (Nova Guiné), Strigopini (Nova Zelândia) e Nestorini (Nova Zelândia).

Por outro lado, Joseph *et al.* (2012), sugeriram que Psittacidae deve incluir as subfamílias Psittacinae (psittacídeos do Velho Mundo) e Arinae (psittacídeos neotropicais). Dentro de Arinae, duas tribos são propostas: Arini e Androglossini. A tribo Arini, cuja monofilia é suportada por

recentes estudos moleculares (Wright *et al.* 2008; Schweizer *et al.* 2014), inclui psittacídeos neotropicais que se distribuem desde o sul dos Estados Unidos até o extremo sul da América do Sul (Forshaw 1989) e representa o maior grupo dentro da ordem, incluindo cerca de 148 espécies em 30 gêneros (de um total de 353 espécies de Psittaciformes; Collar 1997; Tavares *et al.* 2006; Schweizer *et al.* 2010).

O gênero *Aratinga* Spix, 1824 pertence à tribo Arini e inclui cerca de 21 espécies e 49 subespécies de jandaias que se distribuem ao longo da região neotropical e são geralmente caracterizadas pelo porte médio, cauda longa e pontiaguda e plumagem predominantemente verde (Forshaw 1989; Kremer 1989; Collar 1997; Juniper & Parr 1998; Silveira *et al.* 2005; Forshaw 2010; Remsen *et al.* 2013), cuja ecologia ainda é pouco conhecida.

Todas as espécies atualmente inclusas no gênero *Aratinga* já eram reconhecidas por Salvadori (1891), que as agrupou no gênero *Conurus*. Alguns anos depois, Ridgway (1916), com base em caracteres morfológicos e de plumagem, dividiu o gênero *Conurus* em quatro: *Aratinga*, *Eupsittula*, *Nandayus*, e *Thectocercus*. Cory (1918) adotou a classificação de Ridgway, enquanto Miranda-Ribeiro (1920), utilizando plumagem e morfologia do bico, dividiu o gênero *Conurus* em quatro gêneros distintos: *Conurus*, *Nendayus*, *Gymnopsittacus* e *Eupsittacula*. Estes gêneros foram agrupados em *Aratinga* por Peters (1937), após este perceber que o nome *Conurus* Kuhl, 1820, não estava disponível. Peters também restabeleceu *Nandayus nenday* como um gênero monotípico, um arranjo seguido por todos os autores subsequentes (Pinto 1938; Meyer de Schauensee 1970; Forshaw 1989; Sibley & Ahlquist 1990; Arndt 1981, 1995; Collar 1997; Juniper & Parr 1998; Dickinson 2003), exceto por Forshaw (2010), que incluiu *nenday* em *Aratinga*.

Nenhum autor recente publicou estudos considerando as relações interespecíficas no gênero *Aratinga* sensu Peters (1937) e mesmo estudos de taxonomia alfa são surpreendentemente escassos. Entretanto, Silveira *et al.* (2005) foram os primeiros a sugerir a existência de três complexos dentro do gênero (*A. solstitialis*, *A. pertinax* e *A. leucophthalma*) com base em análise de plumagem.

O grupo *A. solstitialis* (*A. solstitialis*, *A. maculata*, *A. jandaya*, *A. auricapillus* e *A. weddellii*) é representado por espécies de bico negro e tamanho mediano, com dimensões variando de 28 a 30 cm. As rêmiges são dorsalmente verdes com porções medianas e distais, respectivamente, azuis e negras; e ventralmente negras. As grandes coberteiras das asas são predominantemente azuis. A parte superior da cauda é majoritariamente verde com a ponta azul, enquanto a parte inferior é negra. *A. maculata* costumava ser tratada como *A. solstitialis* até 2005, quando foi reconhecida

com um táxon distinto por Silveira *et al.* No mesmo estudo, eles também demonstraram que *A. auricapillus aurifrons* é provavelmente um sinônimo júnior de *A. auricapillus*. Segundo Gaban-Lima (2007) *Nandayus nenday* deveria ser incluso no grupo *A. solstitialis*, por apresentar características semelhantes às que definem o complexo *A. solstitialis* (Silveira *et al.* 2005), sendo que tal inclusão é também suportada por estudos moleculares (Ribas & Miyaki 2004; Tavares *et al.* 2006; Freddi 2012; Kirchman *et al.* 2012; Urantowka *et al.* 2012, 2013).

O grupo *Aratinga pertinax* (*A. pertinax*, *A. aurea*, *A. nana*, *A. canicularis* e *A. cactorum*) consiste de indivíduos relativamente pequenos (de 23 a 26 cm), que exibem bico cinzento ou córneo e parte superior do peito marrom-oliva ou cinza. Suas rémiges são dorsalmente azul-esverdeadas e ventralmente cinza-escuro. As retrizes são dorsalmente verdes com a ponta azul e ventralmente oliváceas. Além disso, o complexo *A. pertinax* inclui 14 subespécies (*pertinax*, *xanthogenia*, *tortugensis*, *arubensis*, *aeruginosa*, *lehmanni*, *griseipecta*, *margaritensis*, *venezuelae*, *chrysophrys*, *chrysogenys*, *surinama*, *paraensis* e *ocularis*) que geralmente ocorrem em áreas abertas e de vegetação xerófita na região norte da América do Sul (Arndt 1981; Forshaw 1989; Collar 1997; Juniper & Parr 1998; Forshaw 2010); cuja validade nunca foi testada e relações filogenéticas nunca foram inferidas. Outro problema taxonômico é representado por *A. nana*, que atualmente inclui três subespécies (Forshaw 1989; Collar 1997; Juniper & Parr 1998; Forshaw 2010): *A. n. nana* (Jamaica), *A. n. vicinalis* (Tamaulipas no México) e *A. n. astec* (México, Belize, Guatemala, Honduras, Nicarágua, Costa Rica e oeste do Panamá); sendo que *A. n. astec* apresenta poucas diferenças em relação à *A. nana*, de forma que, provavelmente deveriam ser consideradas um táxon único (Collar 1997; Juniper & Parr 1998). Similarmente, *A. aurea* inclui duas subespécies pouco diferenciadas, *A. a. aurea* e *A. a. major*, cujas validade precisa ser testada. Assim como precisa ser testada a hipótese que o Rio São Francisco no Brasil constitui uma barreira geográfica para as duas subespécies de *A. cactorum*: *A. c. cactorum* e *A. c. caixana* (Peters 1937; Pinto 1938, 1978; Arndt 1981; Forshaw 1989; Collar 1997; Juniper & Parr 1998; Forshaw 2010; Clements *et al.* 2014). Por fim, três subespécies de *A. canicularis* foram sugeridas com base na extensão de laranja e azul na coroa: *A. c. canicularis* (do centro para o sul da América Central), *A. c. eburnirostrum* (sudoeste do México) e *A. c. clarae* (oeste do México). Uma revisão taxonômica para este grupo faz-se urgentemente necessária, já que muitos nomes descritos parecem representar casos de sinonímia e a distribuição de cada táxon nunca foi conferida.

O complexo *A. leucophthalma* (incluindo *A. leucophthalma*, *A. acuticaudata*, *A. mitrata*, *A. wagleri*, *A. erythrogenys*, *A. finschi*, *A. euops*, *A. chloroptera*, *A. holochlora*, *A. rubritorquis* e *A.*

brevipes) exibe porte relativamente grande (de 25 a 38 cm), plumagem predominantemente verde com algum vermelho na face, na garganta, e nas coberteiras inferiores da asa; um conspicuo anel perioftálmico branco e um grande bico de coloração córnea. As rêmiges são ventralmente amarelas, enquanto as retrizes são dorsalmente verdes e ventralmente oliváceas. De acordo com Arndt (2006) *A. mitrata* deveria formar, sozinha, um complexo incluindo três subespécies de diferentes habitats: *A. m. chlorogenys*, *A. m. mitrata* e *A. m. tucumana*. *A. m. chlorogenys* ocorre no Amazonas, em Cajamarca, Huánuco e Junin, localidades peruanas; e exibe um fino anel de penas vermelhas em volta do olho. *A. m. mitrata* pode ser encontrada em Ayacucho, Apurimac e Cusco (Peru), Bolívia e Salta (Argentina); esta subespécie é caracterizada por uma larga faixa de penas verdes abaixo do olho, presença de extensas máculas vermelhas nas faces e coroa de coloração azul. *A. m. tucumana* ocorre em Tucuman, Catamarca, La Rioja e Cordoba, localidades argentinas; ela exibe diferenças na coloração da plumagem, apresentando face completamente vermelha e sem a coroa azul. Além disso, Arndt (2006) também sugeriu a inclusão de *A. alticola* a *A. hockingi* no complexo *A. mitrata*. Alguns autores classificam *A. alticola* como uma subespécie de *A. mitrata* (Chapman 1921; Peters 1937; Arndt 1981; Forshaw 1989; Collar 1997; Juniper & Parr 1998) devido a sua distribuição em uma altitude distinta daquela onde a forma nominal é encontrada. Por outro lado Arndt (2006) e Forshaw (2010) apontam *A. alticola* como uma espécie separada que ocorre simpatricamente com *A. mitrata*. Ainda há outras questões a respeito da classificação de *A. hockingi*, considerada por Arndt (2006) e Forshaw (2010) uma espécie à parte do complexo *A. mitrata*. Dentro do complexo *A. leucophthalma* (Silveira *et al.* 2005), outros quatro grupos precisam urgentemente de uma revisão taxonômica. Por exemplo, *A. leucophthalma* é considerada politípica pela maioria dos autores (Salvadori 1891; Cory 1918; Peters 1937; Arndt 1981; Forshaw 1989; Collar 1997; Juniper & Parr 1998; Forshaw 2010), os quais reconhecem no total quatro subespécies com base no tamanho e na distribuição de penas vermelhas ao longo do corpo: *A. l. leucophthalma* (Guianas, nordeste da Venezuela, leste da Colômbia, Brasil, leste da Bolívia, Paraguai, norte de Uruguai e norte da Argentina), *A. l. callogenys* (sudeste da Colômbia, leste do Ecuador, nordeste de Peru, noroeste do Brasil), *A. l. propinquus* (sudeste do Brasil) e *A. l. nicefori* (Colômbia). Todavia, nenhum autor tem examinado todos os táxons reportados na literatura para conferir suas validade. Da mesma forma, *A. holochlora* inclui as subespécies *A. h. holochlora* (México central), *A. h. brewsteri* (noroeste do México), *A. h. brevipes* (Ilha de Socorro) e *A. h. strenua* (São Salvador, El Salvador e Nicarágua). Entretanto, alguns autores consideram *A. brevipes* (Salvadori 1891; Ridgway 1916; Forshaw 2010) e *A. strenua* (Forshaw 2010) como

espécies plenas. *A. chloroptera* também é considerada politípica pela maioria dos autores (Cory 1918; Peters 1937; Arndt 1981; Collar 1997; Juniper & Parr 1998; Forshaw 2010), os quais consideram *A. c. maugeri* uma subespécie atualmente extinta de *A. c. chloroptera*, que ocorria na Ilha de Mona. Recentemente, Olson (2015), com base em osteologia e plumagem, propôs que esses táxons sejam considerados espécies plenas. Por fim, *A. wagleri*, com base na distribuição de penas vermelhas, inclui quatro subespécies: *A. w. wagleri* (noroeste da Venezuela e oeste da Colômbia), *A. w. transilis* (nordeste da Venezuela), *A. w. frontata* (oeste do Ecuador e do Peru) e *A. w. minor* (região norte e central do Peru); enquanto Forshaw (2010) considera *minor* e *frontata* como subespécies de *A. frontata*.

Embora Silveira *et al.* (2005) tenham incluído *A. acuticaudata* no complexo *A. leucophthalma*, recentes estudos moleculares (Freddi 2012; Urantowka *et al.* 2012, 2013) sugerem a separação de *A. acuticaudata* do gênero *Aratinga* sensu Peters (1937) e a sua inclusão em um grupo monofilético com *Diopsittaca nobilis*. Além disso, Remsen *et al.* (2013), com base em análise de plumagem, também questionaram a monofilia de *Aratinga* sensu Peters (1937) e sugeriram a sua divisão em quatro gêneros distintos: *Aratinga*, *Eupsittula*, *Thectocercus* e *Psittacara*. Em particular, esses autores sugerem que *A. acuticaudata* seja incluído no gênero monotípico *Thectocercus* Ridgway, 1912; sendo o único táxon que apresenta cabeça azulada e retrizes inferiores avermelhadas. Os gêneros *Aratinga* Spix, 1824; *Eupsittula* Bonaparte, 1853 e *Psittacara* Vigors, 1825 incluem as mesmas espécies inclusas respectivamente nos complexos *A. solstitialis* (incluindo *N. nenday*), *A. pertinax* e *A. leucophthalma* (com exceção de *A. acuticaudata*) por Silveira *et al.* (2005).

Apesar de vários estudos moleculares (Ribas & Miyaki 2004; Andrioni 2006; Freddi 2012; Kirchman *et al.* 2012; Urantowka *et al.* 2012, 2013) sugerirem a polifilia do gênero *Aratinga* sensu Peters (1937), nenhuma filogenia molecular incluiu todos os táxons reportados na literatura. Além disso, nunca foram propostas uma hipótese filogenética com base em caracteres morfológicos ou uma revisão taxonômica completa para o gênero. Portanto, este estudo tem como objetivos principais apresentar uma revisão taxonômica de todos os táxons incluídos no gênero *Aratinga* por Peters (1937) e propor uma hipótese filogenética com base em caracteres osteológicos e de plumagem, a fim de testar a questionada monofilia do gênero e comparar os resultados obtidos com aqueles dos estudos moleculares. Nos capítulos 1, 2, 3 e 4 são reportados os resultados da revisão taxonômica e no capítulo 5 as hipóteses filogenéticas.

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Capítulo 1

Morphology, plumage variation and taxonomy of the representatives of the genus *Aratinga* Spix, 1824 (Aves: Psittacidae)

Abstract

The genus *Aratinga* Spix, 1824 includes six species of parakeets distributed throughout South America, traditionally included in the broader genus *Aratinga* by Peters (1937). All subsequent authors followed Peters, until Remsen *et al.* (2013), based on plumage analysis and comparison with published molecular phylogenies, suggested a separation into four distinct genera. Nevertheless, since no comprehensive morphological studies or revisions of *Aratinga* exist, we performed a taxonomic revision based on morphology and morphometrics, in order to understand intra and interspecific variation within the group. Based on analysis of morphology, six taxa with allopatric distribution could be unambiguously diagnosed and were considered species according to the Phylogenetic Species Concept. These species were placed in the genus *Aratinga* Spix, 1824 and they are characterized by black bill; dark blue greater primary coverts; dorsally green with dark blue distal portion and black edged primaries; mainly olive green with dark blue distal portion and black edged upperside of tail; brownish olive underwing-coverts and underside of tail. Moreover, we consider *A. auricapillus aurifrons* (Spix, 1824) as a junior synonym of *A. auricapillus* (Kuhl, 1820), since these taxa do not present significant morphometric or plumage differences.

Resumo

O gênero *Aratinga* Spix, 1824 inclui seis espécies de periquitos que se distribuem ao longo da América do Sul e que tradicionalmente foram incluídas no mais amplo gênero *Aratinga* por Peters (1937). Todos os autores subsequentes adotaram a classificação de Peters, até que Remsen *et al.* (2013), com base na análise de plumagem e comparação com as recentes filogenias moleculares, sugeriram a separação de *Aratinga* em quatro gêneros distintos. No entanto, devido a ausência de estudos morfológicos abrangentes ou revisões completas, foi realizada uma revisão taxonômica com base em morfologia e morfometria, a fim de compreender a variação intra e interespecífica dentro do grupo. Em particular, com base na análise da morfologia, seis táxons com distribuição alopátrica foram inequivocamente diagnosticados e considerados espécies de acordo com o Conceito Filogenético de Espécie. Estas espécies foram agrupadas no gênero *Aratinga* Spix, 1824 cujos representantes são caracterizados por bico negro; grandes coberteiras das asas predominantemente azuis; primárias dorsalmente verdes com porções medianas azuis escuras e distais negras; parte superior da cauda predominantemente verde oliva, com porção mediana azul escuro e distal negra; enquanto a parte inferior das rêmiges e da cauda é marrom esverdeada. Além disso, consideramos *A. auricapillus aurifrons* (Spix, 1824) um sinônimo júnior de *A. auricapillus* (Kuhl, 1820), uma vez que estes táxons não apresentam diferenças morfométricas ou variações de plumagem significativas.

Morphology, plumage variation and taxonomy of the representatives of the genus *Aratinga* Spix, 1824 (Aves: Psittacidae)

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1. INTRODUCTION

The genus *Aratinga* Spix, 1824 currently includes six species distributed throughout South America. These parakeets are characterized by possessing a black bill, mainly green remiges with middle and distal portions deep blue and black respectively, brownish olive underwings and undertail, dark blue greater primary-coverts; and uppertail mostly green, distally deep blue and tipped black. The delimitation of genera and their components had a conturbated history until Remsen *et al.* (2013), based on plumage analysis and comparisons with published molecular phylogenies, included only *Aratinga solstitialis*, *A. maculata*, *A. nenday*, *A. jandaya*, *A. weddellii* and *A. auricapillus* within the components of *Aratinga* Spix.

The taxonomic status of the representatives of this genus has been debated during the past century. *A. solstitialis*, *A. jandaya* and *A. auricapillus* were long supposed to be closely related. Some authors recognized them as full species (Salvadori 1981; Ridgway 1916; Cory 1918; Miranda-Ribeiro 1920; Peters 1937; Pinto 1938), whereas others as subspecies of *solstitialis* (Meyer de Schauensee 1966; Pinto 1978; Joseph 1992; Sick 1997) or of *auricapillus* (Arndt 1981). Salvadori (1891) included *solstitialis*, *jandaya*, *auricapillus*, *weddellii* and *nenday* in the genus *Conurus*, while Ridgway (1916) placed *solstitialis*, *jandaya* and *auricapillus* in *Eupsittula* and *nenday* in the monotypic genus *Nandayus*. Cory (1918) followed Ridgway, but included *weddellii* in *Eupsittula*. In 1920, Miranda-Ribeiro proposed a new arrangement based on plumage and bill morphology, grouping *solstitialis*, *jandaya*, *auricapillus* and *nenday* in the genus *Nendayus* and separating *weddellii* in *Gymnopsittacus*. Peters (1937) included *solstitialis*, *jandaya*, *auricapillus* and *weddellii* in *Aratinga*, whereas *nenday* in *Nandayus*. All subsequent authors (Pinto 1938; Forshaw 1989; Collar 1997; Juniper & Parr 1998; Dickinson 2003) followed Peters, except Forshaw (2010), who included *nenday* in *Aratinga*. Within the *Aratinga solstitialis* complex, only *A. auricapillus* is considered polytypic. Hellmayr (1906) and Cory (1918) first distinguished *A. a. aurifrons* (Spix, 1824) from *A. a. auricapillus* (Kuhl, 1820) due to larger size, darker plumage coloration without yellowish tinge on head, throat and upper breast, and lack of red spots on

lower back in the former. This classification has been adopted by all following authors (Hellmayr 1929; Peters 1937; Pinto 1938, 1978; Forshaw 1989; Collar 1997; Juniper & Parr 1998; Dickinson 2003; Forshaw 2010). Nevertheless, Silveira *et al.* (2005) were unable to find any character supporting the validity of the two taxa and considered *A. a. aurifrons* as a junior synonym of *A. auricapillus*. *Aratinga pintoi* Silveira, Lima & Höfling 2005 was discovered to be a junior synonym of *Psittacus maculatus* Statius Muller, 1776 (Nemesio & Rasmussen 2009). This species remained overlooked and confused with *solstitialis* until Silveira *et al.* (2005) discovered that individuals from Pará, Brazil represent a distinct taxon.

Nevertheless, no comprehensive morphological studies or taxonomic revisions of *Aratinga* Spix exist and molecular studies failed to include all taxa. Therefore, we aimed to examine and document morphological variation within *Aratinga* and to perform a taxonomic revision based on morphological and morphometric characters.

2. MATERIALS AND METHODS

A total of 394 specimens of *Aratinga* (Appendix 1) were examined in the following institutions: Museu de Zoologia da Universidade de São Paulo (MZUSP), São Paulo, Brazil; American Museum of Natural History (AMNH), New York, USA; Smithsonian Institution National Museum of Natural History (USNM), Washington, USA; Field Museum of Natural History (FMNH), Chicago, USA; Louisiana Museum of Natural History (LSUMZ), Baton Rouge, USA; Natural History Museum (BMNH), Tring, UK; Muséum National d'Histoire Naturelle (MNHN), Paris, France. Only two type specimens were analyzed using high-quality photos from the Museum für Naturkunde (ZMB), Berlin, Germany, and University of Michigan Museum of Natural History (UMMZ).

Measurements and photos were taken for each single specimen analyzed. Also all information attached to the specimens, such as museum catalogue number, sex, locality, date and collector, was recorded. Plumage coloration was described using the terminology of Smithe (1975) and Forshaw (2010). It is worth noting that bill, periophthalmic ring and tarsus coloration was codified after examination of alive individuals' photos. Juveniles were identified through incomplete plumage coloring and bill displaying soft areas on the sides of the maxilla (Arndt 2006), and excluded from morphometric analyses. Measurements of exposed culmen without cere, width at base of bill, tarsus-metatarsus, tail and wing chord were obtained for 384 individuals, including captured or captive bred birds, since their exclusion did not change analyses results. Measurements were taken with a digital caliper with a precision of 0.05 mm and a ruler (precision

0.5 mm), according to Baldwin *et al.* (1931). Rectrice measurements were discarded due to the large amount of specimens exhibiting damaged tail. Moreover, 64 skeletons of *Aratinga* (Appendix 2) were examined. Osteological and morphological characters, described according to Baumel *et al.* (1993) and Sereno (2007), were used to propose a phylogenetic hypothesis for the genus *Aratinga* sensu Peters (1937) (Ferraroni & Silveira in prep.).

In order to assess differences in body size statistical analyses, using a significance level of 0.05, were performed in R 3.0.2 (R Core Team 2013), and included Shapiro-Wilk Test for normality, Fligner-Killeen Test for homogeneity, Kruskal-Wallis and Wilcox tests for sexual dimorphism and morphometric differences, and a principal component analysis (PCA). Prior to PCA analysis, a transformation of initial measurements was performed in order to eliminate the effect of shape and size.

The criterion adopted for identifying and delimiting taxonomic units was diagnosability. Characters were selected to find fully diagnosable clusters of individuals sharing similar morphology. These clusters were, after analysis, considered species following the Phylogenetic Species Concept (Nelson & Platnik 1981; Cracraft 1983, 1987, 1989; McKittrick & Zink 1988).

We mapped characters and specimens locality (obtained for 272 individuals) using QuantumGIS 2.0.1-Dufour (2013). Geographical coordinates were obtained using ornithological gazetteers (Paynter Jr 1982, 1989, 1992, 1993, 1995; Paynter Jr & Taylor Jr 1991a, 1991b; Stephens & Taylor Jr 1983, 1985; Vanzolini 1992) or, when not available in the literature, from the following websites: <http://www.fallingrain.com>, <http://www.geographic.org>, <http://www.maplandia.com> and <http://www.wikimapia.com>. Also, photos found on websites such as <http://wikiaves.com.br> and <http://ibc.lynxeds.com> were used to confirm the current distribution of taxa.

Finally, the list of synonyms includes all names considered applicable to the examined taxa after the analysis of morphology. Some vernacular names were included, when used as base for other descriptions. Moreover, were included erroneously spelled names, changes of combination and changes of taxonomic level. When the same name was cited by more than one author, only the first was included in the list.

3. RESULTS AND DISCUSSION

3.1 Morphological characters

Six out of the 29 morphological characters examined (Appendix 3) support the genus *Aratinga* Spix. These characters states were: (1) bill: Sepia 119, (2) greater primary-coverts: Indigo blue 173, (3) primaries: dorsally Parrot green 260 with distal portion Indigo blue 173 and Jet black 89 tip, (4) underwing-coverts: Brownish olive 29, (5) upperside of tail: mainly Olive-green 46 with Indigo blue 173 distal portion and Jet Black 89 tip, (6) underside of tail: Brownish olive 29. Some of these characters (bill, remiges and tail coloration) had already been suggested by Silveira *et al.* (2005) to defying the *Aratinga solstitialis* species complex, whereas greater primary-coverts coloration is here proposed for the first time. Furthermore, nine out of the 40 osteological characters analyzed (Appendix 4) supported the splitting of *Aratinga* Spix from *Aratinga* sensu Peters (1937). Particularly, in the representants of the genus here proposed (1) the crista of the median portion of the palatine does not touch the pterygoid, (2) the median portion of the *proc. orbitalis* of the lacrimal does not present an indent, (3) the *rostrum maxillae* presents an elongated shape, (4) the *foramen pneumaticum palatini* is small (less than 50% of palatine's width), (5) the *fenestra caudalis mandibulae* is absent, (6) the *proc. retroarticularis* of the mandible forms an obtuse triangle, (7) the *tuberculum preacetabulare* is not prominent, (8) the *sutura iliosynsacralis* of the pelvis is closed, (9) the *ala parasphenoidalis* does not present a ridge.

When Spix (1824) described the genus *Aratinga* included 17 species of south american parakeets: *A. carolinae augustae*, *A. haemorrhous*, *A. chrysocephalus*, *A. luteus sive guarouba*, *A. xanthopterus*, *A. acutirostris*, *A. aurifrons*, *A. cyanogularis*, *A. flaviventer*, *A. caixana*, *A. ninus*, *A. perlatus*, *A. fasciatus*, *A. melanurus*, *A. nobilis sive guianensis*, *A. aureus*, *A. pertinax*, *A. virescens*. Following Spix (1824), Gray (1855) subsequently designated *Psittacus luteus* Boddaert, 1783 as the type species for the genus, classification that has been followed ever since. Being *Psittacus luteus* a senior synonym of *A. maculata*, and not *A. solstitialis* as suggested by Remsen *et al.* (2013), the type species of *Aratinga* Spix, 1824 should be *A. maculata* (Statius Muller, 1776).

An important step, when revising the alpha taxonomy of a group, is identifying and examining the type specimens. Unfortunately, these specimens, particularly the oldest ones, are often unavailable, due to loss or destruction, as happened in the case of *A. solstitialis*, *A. jandaya*, *A. a. aurifrons*, *A. weddellii* and *A. nenday*. According to the *International Code of Zoological Nomenclature* (1999, hereafter the *Code*), illustrations can be used as the source of description, a practice that was already common among the first ornithologists when describing exotic species.

However, Article 72.5.6. states that “the name-bearing type is the specimen or specimens illustrated or described (and not the illustration or description itself)”. In particular, in the case of *A. solstitialis*, the type specimen is lost, but because Linnaeus based his description on Albin’s (1731) description and illustration, some authors suggest that the specimen represented in Albin’s plate (Figure 1) be designated as the neotype of *Psittacus solstitialis* Linnaeus, 1758. In fact, the bird in the illustration presents yellow mixed with orange on crown, nape, throat, scapulars and orange belly, peculiar of *A. solstitialis*. Nevertheless, according to Article 75.2. “a neotype is not to be designated as an end in itself, or as a matter of curatorial routine, and any such neotype designation is invalid”. Therefore, there is no need to designate a neotype for *A. solstitialis* because there is no doubt this name is attributed to its first mention. Moreover, regarding the type locality of *A. solstitialis*, Linnaeus reported “Guinea”, whereas Albin stated that the bird was brought from “East-Indies”. Since *A. solstitialis* does not occur in Africa nor in the Indies, the type locality was reassigned to Cayenne by Hellmayr (1906). Regardless of that, we know that Cayenne was used as type locality for many species described in the 17th and 18th centuries and probably referred to one of the main ports where the specimens were dispatched to Europe. Therefore, according to the Art. 76A.2. of the *Code*, we here suggest that the type locality should be “fields near the Rio Branco” Spix (1824), the first locality reported in the literature which lies within the range of *A. solstitialis*.



Figure 1. Albin’s plate illustrating the “Petit Perroquet d’Angola” (*P. solstitialis*), published in *A Natural History of Birds*, III (1731).

We did not find any significant difference in plumage or morphometrics between *A. a. auricapillus* (Kuhl, 1820) and *A. a. aurifrons* (Spix, 1824). Therefore, we consider the latter as a junior synonym of *A. auricapillus* (Appendix 5). Moreover, the original description of *A. nenday*, *Psittacus nenday* Vieillot, 1823, was based on Azara's (1803) description, where Azara reported "Paraguay" as the type locality. In 1938, Brodkorb described a new subspecies from Paraguay that he named *Nandayus nenday campicola*. In our analysis it did not report any difference in plumage from the nominotypic *Psittacus nenday* Vieillot, 1823; the same applying to *Conurus canibuccalis* Rothschild, 1907; a junior synonym of the name *Aratinga weddellii*.

Based on our analysis of morphology, six taxa could be unambiguously diagnosed (Figures 2, 3, 4, 5). These species have allopatric distributions, particularly, there seems to be no overlap in the distribution of *A. jandaya* and *A. solstitialis*, despite their close distribution in Goiás, Brazil (Silveira *et al.* 2005).

***Aratinga solstitialis* (Linnaeus, 1758)**

Petit Parroquet d'Angola Albin 1738. A Natural History of Birds, III, p. 6, pl. 13.

Psittacus solstitialis Linnaeus, 1758. Systema Naturae, I, p. 141, n°12, 1766, based on Albin's description. Type specimen missing. Type locality: Guinea.

Psittacus guarouba Hahn, 1822. Voegel, aus Asien, Africa, America und Neuholland, in Abbildungen nach der Natur mit Beschreibungen. Lief. xiii, t. 3.

Aratinga luteus sive guarouba Spix, 1824. Avium Species Novae, I, p. 30, t. XIV a.

Conurus solstitialis Lesson, 1831. Traité d'Ornithologie, p. 212.

Sittace solstitialis Wagler, 1832. Monographia Psittacorum, p. 655.

Psittacaria solstitialis Schomburgk, 1841. Reisen in British-Guiana in der Jahren (1840-84).

Conurus solstitialis Gray, 1845. Genera of Birds, II, p. 413, n°9.

Conurus luteus Sclater, 1862. Proceedings of the Zoological Society, p. 185.

Conurus solstitialis - Salvadori, 1891. Catalogue of the Birds of the British Museum, XX, p. 175.

Eupsittula solstitialis Ridgway, 1916. Bulletin of the United States National Museum, n° 50, part VII, p. 162.

Nendayus solstitialis Miranda-Ribeiro, 1920. Revista do Museu Paulista, XII, p. 24.

Aratinga solstitialis Peters, 1937. Checklist of the Birds of the World, III, p. 188.

Aratinga solstitialis solstitialis Pinto, 1978. Novo Catalogo das aves do Brasil. Primeira parte, p. 135.

Aratinga solstitialis - Forshaw, 1989. Parrots of the World. Parrots of the world, third ed. Landsdowne Editions, Melbourne, Australia, p. 442.

Aratinga auricapilla solstitialis Arndt, 1981. Sudamerikanische Sittiche Keilschwanzsittiche i.e. S., Horst Muller-Verlag Walsrode, p. 72.

Aratinga solstitialis solstitialis - Joseph, 1992. Notes on the distribution and natural history of the Sun parakeet *Aratinga solstitialis solstitialis*. *Ornitologia Neotropical* 3, 17–26.

Aratinga solstitialis - Collar, 1997. In Eds del Hoyo, J.; Handbook of the Birds of the World, IV. Sandgrouse to Cuckoos. Lynx Edicions, Barcelona, p. 431.

Diagnosis: characterized by yellow (Orange Yellow 18) mixed with orange (Chrome Orange 16) throat, crural feathers, scapulars and rump; orange (Chrome Orange 16) breast and belly. Yellow (Orange Yellow 18) dorsal neck, bend of wing, lesser wing and underwing-coverts. Median wing-coverts are mainly green (Parrot Green 260) with some yellow (Orange Yellow 18).

Distribution: occurs in dry, semi-deciduous forests of northeastern Roraima state, Brazil, adjacent Guyana and extreme western Suriname (Restall *et al.* 2006; BirdLife International 2015).

***Aratinga maculata* (Statius Muller, 1776)**

Psittacus maculatus Statius Muller, 1776. *Natursystem*, p. 76. Examined types: neotype MZUSP75746, female, Monte Alegre, Colonia do Ereré, Pará, Brazil, 4.ix.2003, collected by L. F. Silveira; 7 paratypes: MZUSP75749, MZUSP75748, MZUSP75747, MZUSP75750 (Monte Alegre, Colonia do Ereré, Pará) and AMNH474260, AMNH474275, AMNH474259 (Rio Maycuru, Pará).
Guarouba or *Perriche jaune* Buffon, 1779. *Histoire Naturelle, Generale et Particuliere, avec la Description du Cabinet du Roi*, VI, p. 272.

Psittacus luteus Boddaert, 1783. *Table des Planches Enluminez d'Histoire Naturelle de M. D'Aubenton*, pl. 525, p. 507.

Aratinga luteus or *guarouba* Spix, 1824. *Avium Species Novae*, I, t. xiv, p. 30.

Conurus luteus Gray, 1855. *Catalogue of the Genera and Subgenera of Birds contained in the British Museum*, p. 87.

Conurus maculatus Cassin, 1864. *Proceedings of the Academy of Natural Sciences of Philadelphia*, p. 239.

Aratinga pinto Silveira, Lima & Höfling, 2005. A new species of *Aratinga* parakeet (Psittaciformes: Psittacidae) from Brazil, with taxonomic remarks on the *Aratinga solstitialis* complex. *The Auk* 122(1), 292-305.

Aratinga maculata Nemesio & Rasmussen, 2009. The rediscovery of Buffon's "Guarouba" or "Perriche jaune": two senior synonyms of *Aratinga pinto* Silveira, Lima & Höfling, 2005 (Aves: Psittaciformes). *Zootaxa* 2013, 1-16.

Diagnosis: diagnosed by yellow (Orange Yellow 18) with some green (Parrot Green 260) breast, crural feathers, nape, dorsal neck, scapulars, bend of wing, lesser wing and underwing-coverts. Yellow (Orange Yellow 18) upper throat and yellow (Orange Yellow 18) mixed with orange (Chrome Orange 16) belly. Median wing-coverts are mainly yellow (Orange Yellow 18) with green (Parrot Green 260). Yellow (Orange Yellow 18) mixed with green (Parrot Green 260) and some orange feathers (Chrome Orange 16) on rump.

Distribution: found in areas with large tracts of forest, sandy soils and adjacent savanna in Pará and Amapá, Brazil and extreme southern Suriname (Silveira *et al.* 2005; BirdLife International 2015).

***Aratinga jandaya* (Gmelin, 1788)**

Jendaya Marcgrave, 1648. *Historia Naturalis Brasiliae*, IX, p. 206.

Psittacus jandaya Gmelin, 1788. *Systema Naturae*, p. 319, n°5. Based on Marcgrave's description.

Type specimen missing. Type locality: Brazil.

Psittacus jendaya Latham, 1790. *Index Ornithologicus*, I, p. 92, n°30.

Sittace jendaya Wagler, 1832. *Monographia Psittacorum*, p. 653.

Trichoglossus (Psittacus) cruentus Lesson, 1844. *Echo du Monde Savant*, p. 126.

Conurus jendaya Gray, 1845. *Genera of Birds*, p. 413, n°10.

Conurus jandaya Gray, 1859. *List of the Specimens of Birds in the British Museum*, III, p.36.

Conurus pyrocephalus Reichenow, 1881. *Journal fur Ornithologie*, p. 279.

Conurus jendaya - Salvadori, 1891. *Catalogue of the Birds of the British Museum*, XX, p. 177.

Eupsittula jendaya Cory, 1918. *Catalogue of the Birds of the Americas*, I, part II, p. 61.

Nendayus jendaya Miranda-Ribeiro, 1920. *Revista do Museu Paulista*, XII, p. 25.

Aratinga jandaya Hellmayr, 1929. *Contribution to the Ornithology of Northeastern Brazil*, p. 440, n°390.

Aratinga solstitialis jandaya Pinto, 1978. Novo Catalogo das aves do Brasil. Primeira parte, p. 135.

Aratinga auricapilla jandaya Arndt, 1981. Sudamerikanische Sittiche Keilschwanzsittiche i.e. S., Horst Muller-Verlag Walsrode, p. 71.

Aratinga jandaya - Forshaw, 1989. Parrots of the World. Parrots of the world, third ed. Landsdowne Editions, Melbourne, Australia, p. 440.

Diagnosis: characterized by yellow (Orange Yellow 18) cheeks and nape, whereas the auriculars are yellow (Orange Yellow 18) mixed with orange (Chrome Orange 16). Red (Flame Scarlet 15) with some light green (Lime Green 159) breast and crural feathers, and red (Flame Scarlet 15) belly. Lesser underwing-coverts are mainly green (Parrot Green 260) with red (Flame Scarlet 15) mixed with yellow (Orange Yellow 18).

Distribution: endemic of Brazil occurs in *cerrado* (Tocantins and northeast Goiás), *caatinga* (east Rio Grande do Norte, Pernambuco, Piauí), Atlantic forest (east Alagoas) and Amazonian biome (east Pará, Maranhão).

***Aratinga auricapillus* (Kuhl, 1820)**

Psittacus auricapillus Kuhl, 1820. Conspectus Psittacorum, p. 20. Syntype: ZMB10167, Brazil, Sello Friedrich.

Psittacus aureus Donovan, 1824. The naturalist's Repository, II, pl. 72.

Aratinga aurifrons Spix, 1824. Avium Species Novae, I, t. xvi, Fig. 1, Fig. 2, p. 32. Type specimen missing. Type locality: Minas Gerais, Brazil.

Psittacara auricapillus Vigors, 1825. The Zoological Journal, II, 1825-1826, p. 389.

Psittacus solstitialis (juvenile) Voigt, 1831. Cuvier, das Thierreich, geodnet nach seiner Organisation, p. 726.

Arara auricapillus Lesson, 1831. Traité d'Ornithologie, p. 188.

Conurus auricapillus Lesson, 1831. Traité d'Ornithologie, p. 212.

Aratinga auricapilla Bonaparte, 1854. Revue et Magasin de Zoologie, VI, p.150, n°46.

Conurus jendaya, var. meridionalis n°402, Pelzen, 1871. Zur Ornithologie Brasiliens, p. 257.

Conurus auricapillus - Salvadori, 1891. Catalogue of the Birds of the British Museum, XX, p. 178.

Conurus auricapillus aurifrons Hellmay, 1906. Revision der Spix'schen Typen Brasilianischer Vögel. Abhandlungen der Deutschen Akademie der Wissenschaften zu München, Mathematisch-Physikalische Klasse, p. 582.

- Conurus auricapillus auricapillus* Hellmayr, 1906. Revision der Spix'schen Typen Brasilianischer Vögel. Abhandlungen der Deutschen Akademie der Wissenschaften zu München Mathematisch Physikalische Klasse, p. 582.
- Eupsittula auricapillus auricapillus* Cory, 1918. Catalogue of the Birds of the Americas, I, part II, p. 61.
- Eupsittula auricapillus aurifrons* Cory, 1918. Catalogue of the Birds of the Americas, I, part II, p. 61.
- Nendayus auricapillus* Miranda-Ribeiro, 1920. Revista do Museu Paulista, XII, p. 25.
- Aratinga auricapilla aurifrons* Hellmayr, 1929. Contribution to the Ornithology of Northeastern Brazil, p. 441.
- Aratinga auricapilla auricapilla* Hellmayr, 1929. Contribution to the Ornithology of Northeastern Brazil, p. 441.
- Aratinga auricapillus aurifrons* Peters, 1937. Checklist of the Birds of the World, III, p. 188.
- Aratinga auricapillus auricapillus* Peters, 1937. Checklist of the Birds of the World, III, p. 188.
- Aratinga auricapilla auricapilla* - Pinto, 1938. Catalogo das aves do Brasil. Primeira parte, p. 189.
- Aratinga auricapilla aurifrons* - Pinto, 1938. Catalogo das aves do Brasil. Primeira parte, p. 189.
- Aratinga solstitialis auricapilla* Pinto, 1978. Novo Catalogo das aves do Brasil. Primeira parte, p. 135.
- Aratinga auricapilla auricapilla* - Arndt, 1981. Sudamerikanische Sittiche Keilschwanzsittiche i.e. S., Horst Muller-Verlag Walsrode, p. 70.
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- Aratinga auricapillus aurifrons* - Juniper & Parr, 1998. Parrots. A Guide to Parrots of the World. Yale University Press, New Haven, Connecticut, p. 447.
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Several authors (Hellmayr 1906; Cory 1918; Hellmayr 1929; Peters 1937; Pinto 1938, 1978; Forshaw 1989; Collar 1997; Juniper & Parr 1998; Dickinson 2003; Forshaw 2010) suggested that *A. a. aurifrons* (Spix, 1824) can be distinguished from *A. a. auricapillus* (Kuhl, 1820) based on its larger size; darker plumage coloration; lack of yellowish tinge on head, throat and upper breast; and lack of red spots on lower back. According to these authors it occurs in southeastern Brazil, from Minas Gerais and southern Goiás to Santa Catarina; whereas *A. a. auricapillus* inhabits northern and

central Bahia, Brazil. As previously suggested by Silveira *et al.* (2005), none of the differences reported in the literature seem to support the validity of *A. a. aurifrons* (Appendix 5), therefore we consider it as a junior synonym of *A. auricapillus* (Kuhl, 1820).

Diagnosis: *A. auricapillus* is characterized by green (Parrot Green 260) nape and cheeks; auriculars can be totally light green (Lime Green 159) or light green (Lime Green 159) with a tinge of red (Flame Scarlet 15). Upper throat and throat are light green (Lime Green 159). Lesser underwing-coverts are green (Parrot Green 260) and red (Flame Scarlet 15). Breast is light green (Lime Green 159) with some red (Flame Scarlet 15), while belly is red (Flame Scarlet 15) with some green (Lime Green 159) feathers.

Distribution: *A. auricapillus* is a forest-dwelling species, endemic of Brazil, that occurs in east Bahia, Goiás, Minas Gerais, Espírito Santo, Rio de Janeiro, São Paulo and Paraná (BirdLife 2015).

***Aratinga nenday* (Vieillot, 1823)**

Nenday Azara, 1803. Apuntamientos para la Historia Natural de los Pajaros, II, p. 422.

Psittacus nenday Vieillot, 1823. Tableau Encyclopedie et Methodique de Ornithologie, III, p. 1400.

Based on Azara's description. Type specimen missing. Type locality: Paraguay.

Sittace nenday Wagler, 1832. Monographia Psittacorum, p. 646.

Psittacara nenday Bourjot Saint Hilaire, 1837-1838. Histoire Naturelle des Perroquets, XIII, pl. 20.

Conurus nenday Gray, 1845. Genera of Birds, p. 413, n°19.

Nandayus melanocephalus Bonaparte, 1854. Revue et Magasin de Zoologie, VI, p.150, n°30.

Conurus nanday Gray, 1859. List of the Specimens of Birds in the British Museum, III, p. 35.

Nandayus nanday Gray, 1870. Hand-list of Genera and Species of Birds distinguishing those contained in the British Museum, II, p. 147, n°8106.

Conurus nandaya Sclater, 1870. Proceedings of the Zoological Society of London, p. 383.

Conurus melanocephalus Reichnow, 1881. Journal fur Ornithologie, p. 280.

Conurus nenday - Salvadori, 1891. Catalogue of the Birds of the British Museum, XX, p. 179.

Aratinga nandaya Brabourne & Chubb, 1912. The Birds of South America, I, p. 81, n° 754.

Nandayus nenday Cory, 1918. Catalogue of the Birds of the Americas, I, part II, p. 65.

Nendayus nenday Miranda-Ribeiro, 1920. Revista do Museu Paulista, XII, p. 24.

Nandayus nenday - Peters, 1937. Checklist of the Birds of the World, III, p. 191.

Nendayus nenday - Pinto, 1938. Catalogo das aves do Brasil. Primeira parte, p. 192.

Nandayus nenday campicola Brodkorb, 1938. Occasional Papers of the Museum of Zoology, University of Michigan, p. 2. Examined type: UMMZ93297, adult male, 265 km west of Puerto Casado, Paraguay, 13.x.1936, A. Schulze.

Nandayus nenday - Pinto, 1978. Novo Catalogo das aves do Brasil. Primeira parte, p. 137.

Aratinga nenday Forshaw, 2010. Parrots of the World. A & C Black Publishers Ltd, London, p. 188.

Diagnosis: it can be diagnosed by a beige (Beige 219D) tarsus. The area around the eye, the forehead and auriculars are black (Jet Black 89). Cheeks, upper throat and crown are mainly black (Jet Black 89), but in some individuals they can present some red feathers (Flame Scarlet 15). Nape is black (Jet Black 89), but in some individuals can be turquoise (Turquoise Green 64) mixed with light green (Lime Green 159). Throat is turquoise (Turquoise Green 64). Crural feathers are red (Flame Scarlet 15).

Distribution: *A. nenday* occurs in *pantanal*, in the upper Rio Paraguay, from Santa Cruz, southeastern Bolivia, and Mato Grosso do Sul, Brazil, through central Paraguay to northern Argentina.

***Aratinga weddellii* (Deville, 1851)**

Conurus weddellii Deville, 1851. Revue et Magasin de Zoologie, III, p. 209. Type specimen missing.

Type locality: village of Pebas on the Upper Amazon River, Peru.

Maracana weddellii Des Murs, 1855. Expedition dans le parties centrales de l’Amerique du Sud, Oiseaux, p. 13, pl. 2.

Conurus poliocephalus Finsch, 1867. Die Papageien, I, p. 498.

Sittace poliocephala Pelzen, 1871. Zur Ornithologie Brasiliens, p. 258.

Conurus weddellii - Salvadori, 1891. Catalogue of the Birds of the British Museum, XX, p. 180.

Conurus canibuccalis Rothschild, 1907. Bulletin of The British Ornithologists' Club, XVI, p. 48. Type: AMNH474296, Type n°1076, Amazonas, Rio Madeira, Humaytha, Brazil, 11.viii.1906, Hoffmanns collection.

Eupsittula weddellii Cory, 1918. Catalogue of the Birds of the Americas, I, part II, p. 61.

Gymnopsittacus weddellii Miranda-Ribeiro, 1920. Revista do Museu Paulista, XII, p. 26.

Aratinga weddellii Peters, 1937. Checklist of the Birds of the World, III, p. 188.

Diagnosis: characterized by a white periophthalmic ring. The area around the eye, forehead, cheeks, auriculars, upper throat, throat, crown and nape are bluish gray (Pratt's Payne's Gray 88). Breast is green (Parrot Green 260).

Distribution: inhabits *pantanal*, humid and semi-humid forests. It ranges east of the Andes from southeastern Colombia through east Ecuador, eastern and northern Peru, northwest Brazil (Amazonas, Acre, Rondonia and extreme southwestern Mato Grosso) to northeastern Bolivia.



Figure 2. Dorsal view of the six species of *Aratinga*, all exhibiting mainly green upperside of tail with dark blue distal portion and black tip. From the left to the right: *A. solstitialis* (Linnaeus, 1758), *A. weddellii* (Deville, 1851), *A. auricapillus* (Kuhl, 1820), *A. maculata* (Statius Muller, 1776), *A. jandaya* (Gmelin, 1788) and *A. nenday* (Vieillot, 1823).



Figure 3. Ventral view of the six species of *Aratinga*, showing that all present black bill and brownish olive underside of tail. From the left to the right: *A. solstitialis* (Linnaeus, 1758), *A. weddellii* (Deville, 1851), *A. auricapillus* (Kuhl, 1820), *A. maculata* (Statius Muller, 1776), *A. jandaya* (Gmelin, 1788) and *A. nenday* (Vieillot, 1823).



Figure 4. Lateral view of the six species of *Aratinga*, that all share dark blue greater primary-coverts and primaries dorsally green with dark blue distal portion and black tip. From the left to the right: *A. solstitialis* (Linnaeus, 1758), *A. weddellii* (Deville, 1851), *A. auricapillus* (Kuhl, 1820), *A. maculata* (Statius Muller, 1776), *A. jandaya* (Gmelin, 1788) and *A. nenday* (Vieillot, 1823).

3.2 Morphometric analyses

All analyses were performed with both *A. auricapillus* as polytypic and monotypic, but here we report only the results of *A. auricapillus* as a single taxon because statistical analyses did not support any significant morphometric difference between *A. a. auricapillus* and *A. a. aurifrons*, as already suggested by Silveira *et al.* (2005), except for a slight difference in wing length (Appendix 6). Data were not normally distributed, the p-value in the Shapiro-Wilk test resulted to be less than the chosen alpha level (0.05) for all measurements. Therefore a non-parametric Fligner-Killeen test was selected to test for homogeneity of variances. All variances were homogeneous, with the exception of tarsus length (p-value =0.016). A Kruskal-Wallis, performed to test for sexual dimorphism, reported significant differences in exposed culmen (p-value =0.016) and tarsus length (p-value =0.040); particularly, culmen seems to be longer in males of *A. jandaya* (p-value =0.003), *A. weddellii* (p-value =0.0001) and *A. maculata* (p-value =0.014); whereas tarsus resulted longer in males of *A. solstitialis* (p-value =0.005) and in females of *A. auricapillus* (p-value =0.051).

Significant morphometric differences were found in the Kruskal-Wallis test for all measurements, thus pairwise comparisons using Wilcoxon rank sum test were performed between pairs of taxa (Table 1). In particular, *A. nenday* and *A. weddellii* seem to differ in size from the other taxa, being the largest and the smallest, respectively (Table 2). In the principal component analysis (PCA) the first two principal components explained 79% of the variance between all taxa (Eigenvalue—79.29%). The first component (58.89 %) refers to wing and culmen length; while the second (20.40 %) refers to width of bill and tarsus length. As we can see in the graph (Figure 6), the PCA showed overlap between all species with the exception of *A. nenday* and *A. weddellii*, that resulted separated from the others.

Table 1. Pairwise comparisons between pairs of taxa using Wilcoxon rank sum test for 4 morphometric parameters. Ns = no significant difference; <0.05 = significant difference.

Taxa	Culmen	Bill width	Wing	Tarsus
<i>jandaya - auricapillus</i>	= 0.05	< 0.0001	< 0.0001	Ns
<i>jandaya - maculata</i>	= 0.05	Ns	< 0.05	Ns
<i>jandaya - nenday</i>	< 0.0001	Ns	< 0.0001	< 0.0001
<i>jandaya - solstitialis</i>	< 0.0001	< 0.05	Ns	< 0.0001
<i>jandaya - weddellii</i>	< 0.0001	< 0.0001	< 0.0001	< 0.05
<i>auricapillus - maculata</i>	< 0.05	< 0.05	< 0.0001	Ns
<i>auricapillus - nenday</i>	< 0.05	< 0.0001	< 0.0001	< 0.0001
<i>auricapillus - solstitialis</i>	< 0.05	< 0.0001	< 0.0001	< 0.05
<i>auricapillus - weddellii</i>	< 0.0001	< 0.0001	< 0.0001	< 0.05
<i>maculata - nenday</i>	< 0.0001	Ns	< 0.0001	< 0.0001
<i>maculata - solstitialis</i>	Ns	Ns	Ns	< 0.05
<i>maculata - weddellii</i>	< 0.0001	< 0.0001	< 0.0001	Ns
<i>nenday - solstitialis</i>	< 0.0001	Ns	< 0.0001	< 0.0001
<i>nenday - weddellii</i>	< 0.0001	< 0.0001	< 0.0001	< 0.0001
<i>solstitialis - weddellii</i>	< 0.0001	< 0.0001	< 0.0001	Ns

Table 2. Morphological measurements (mm) as mean and standard deviation (first row) and minimum and maximum values (second row) for male and female of each of the six recognized taxa.

Taxa	Bill width M	Bill width F	Culmen M	Culmen F	Wing M	Wing F	Tarsus M	Tarsus F
<i>solstitialis</i>	12.46±0.56 (11.23-13.20)	12.47±0.33 (11.88-12.91)	22.29±0.67 (20.85-23.18)	22.03±0.8 (20.78-22.86)	155.3±5.09 (144-164)	154.7±5.28 (146-161)	14.83±0.4 (14.18-15.80)	14.27±0.45 (13.38-14.71)
<i>maculata</i>	12.68±0.3 (12.22-13.09)	12.90±0.87 (11.85-13.89)	22.77±0.48 (22.21-23.63)	22±0.32 (21.64-22.30)	150.9±7.38 (138-161)	153.6±3.65 (151-160)	15.12±0.47 (14.57-15.89)	15.45±0.8 (14.53-16.26)
<i>jandaya</i>	12.85±0.51 (12.04-14.29)	12.69±0.59 (11.12-13.81)	23.23± 1.18 (20.16-27.50)	22.41±0.92 (20.29-24.18)	157.4±6.84 (144-172)	157.5±3.43 (152-165)	14.96±0.8 (13.16-16.20)	15.32±0.7 (14-16.64)
<i>auricapillus</i>	13.55±0.63 (11.65-14.81)	13.30±0.57 (11.75-14.32)	23.39±1.52 (15.23-24.82)	23.23±0.78 (21.50-24.91)	163.1±4.20 (156-173)	161.3±4.85 (150-170)	14.88±0.81 (13.10-16.42)	15.26±0.7 (13.87-17.05)
<i>nenday</i>	12.82±1.42 (11.49-18.30)	12.64±0.47 (11.86-13.38)	24.11±0.95 (22.26-26)	23.65±0.96 (21.88-25.10)	181.3±7.10 (165-193)	177.8±4.22 (169-184)	16.37±1.08 (14.37-18.37)	16.99±1.21 (14.29-19.23)
<i>weddellii</i>	11.95±0.48 (10.82-12.86)	11.67±0.55 (10.40-12.52)	21.14±0.73 (19.78-22.94)	20.43±0.79 (18.33-22.33)	142.3±3.8 (135-150)	140.8±3.94 (132-149)	14.63±0.93 (11.97-16.64)	14.61±0.90 (11.86-16.08)

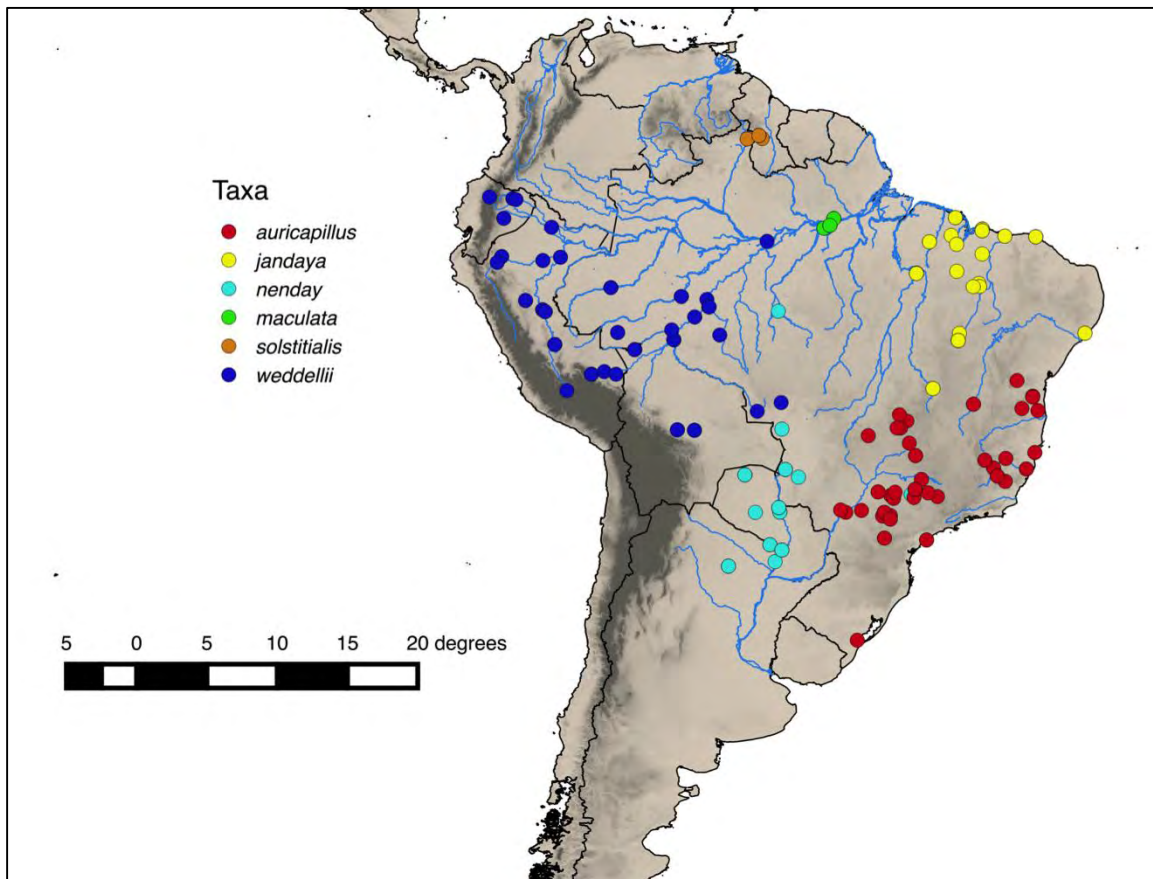


Figure 5. Distribution of analyzed specimens of *Aratinga* with locality information on label. Blue: *A. weddellii*, light blue: *A. nenday*, orange: *A. solstitialis*, green: *A. maculata*, yellow: *A. jandaya*, red: *A. auricapillus*.

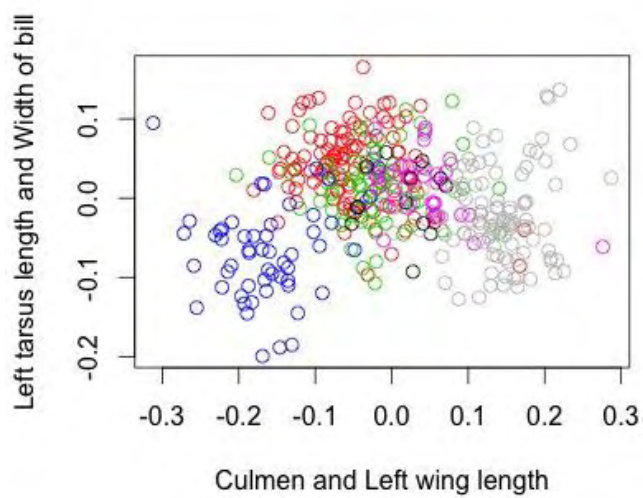


Figure 6. Results of the principal component analysis (Eigenvalue-79.29 %). Red: *A. auricapillus*, green: *A. jandaya*, blue: *A. nenday*, black: *A. maculata*, light purple: *A. solstitialis*, gray: *A. weddellii*.

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APPENDICES

Appendix 1. List of analyzed specimens, where “NA” refers to missing data.

Taxon	Number	Sex	Country	State/Region	Locality
<i>auricapillus</i>	AMNH474277	M	Brazil	São Paulo	Faz. Cayoa, Salto Grande, Rio Paranapanema
<i>auricapillus</i>	AMNH139937	M	Brazil	Paraná	Faz. M. H.
<i>auricapillus</i>	AMNH316586	F	Brazil	Minas Gerais	Casa Queimada, Serra do Caparão
<i>auricapillus</i>	AMNH316585	F	Brazil	Minas Gerais	Casa Queimada, Serra do Caparão
<i>auricapillus</i>	AMNH474284	F	Brazil	Minas Gerais	Rio Jordao, Araguay
<i>auricapillus</i>	AMNH474285	F	Brazil	Minas Gerais	Rio Jordao, Araguay
<i>auricapillus</i>	AMNH474286	M	Brazil	NA	NA
<i>auricapillus</i>	AMNH241690	M	Brazil	Bahia	Cajazeiras
<i>auricapillus</i>	AMNH317289	F	Brazil	Espírito Santo	Lagoa Juparanã
<i>auricapillus</i>	AMNH474278	M	Brazil	NA	Rio das Cinzas
<i>auricapillus</i>	AMNH474281	NA	Brazil	Bahia	NA
<i>auricapillus</i>	ZMB10167	NA	Brazil	Bahia	NA
<i>auricapillus</i>	AMNH6209	NA	Brazil	NA	NA
<i>auricapillus</i>	AMNH308010	NA	Brazil	NA	NA
<i>auricapillus</i>	AMNH6210	NA	Brazil	NA	NA
<i>auricapillus</i>	AMNH308009	NA	Brazil	NA	NA
<i>auricapillus</i>	AMNH317282	M	Brazil	NA	NA
<i>auricapillus</i>	AMNH241691	M	Brazil	Bahia	Iracema
<i>auricapillus</i>	AMNH317288	F	Brazil	Espírito Santo	Lagoa Juparanã
<i>auricapillus</i>	AMNH170140	F	Brazil	Bahia	Verruga, Rio Pardo
<i>auricapillus</i>	AMNH474276	M	Brazil	São Paulo	Faz. Cayoa, Salto Grande, Rio Paranapanema
<i>auricapillus</i>	AMNH474282	NA	Brazil	Espírito Santo	Lagoa Juparanã
<i>auricapillus</i>	AMNH241688	M	Brazil	Bahia	Cajazeiras
<i>auricapillus</i>	AMNH241689	F	Brazil	Bahia	Cajazeiras
<i>auricapillus</i>	AMNH474283	M	Brazil	NA	Rio Jordao, Araguay
<i>auricapillus</i>	AMNH474279	M	Brazil	Bahia	NA
<i>auricapillus</i>	AMNH474280	NA	Brazil	Bahia	NA

<i>auricapillus</i>	AMNH44716	NA	Brazil	Bahia	NA
<i>auricapillus</i>	MZUSP14011	M	Brazil	Bahia	R. Gongogi, confl. Rio Novo
<i>auricapillus</i>	MZUSP14012	M	Brazil	Bahia	R. Gongogi, confl. Rio Novo
<i>auricapillus</i>	MZUSP14013	F	Brazil	Bahia	R. Gongogi, confl. Rio Novo
<i>auricapillus</i>	MZUSP90903	NA	Brazil	Bahia	RPPN Serra Bonita, Camacan
<i>auricapillus</i>	MZUSP14885	M	Brazil	Goiás	Faz. Thomé Pinto, Jaragua, Rio das Almas
<i>auricapillus</i>	MZUSP26716	F	Brazil	Goiás	Faz. Transvaal, Municipio de Rio Verde
<i>auricapillus</i>	MZUSP33033	F	Brazil	Goiás	Caldas Novas
<i>auricapillus</i>	MZUSP51815	F	Brazil	Goiás	Goiânia
<i>auricapillus</i>	MZUSP52364	M	Brazil	Goiás	Goiânia
<i>auricapillus</i>	MZUSP65087	F	Brazil	Goiás	Goiânia
<i>auricapillus</i>	MZUSP24505	F	Brazil	Minas Gerais	R. Doce, baixo Piracicaba (margem direita)
<i>auricapillus</i>	MZUSP24506	M	Brazil	Minas Gerais	R. Doce, baixo Suassuhy
<i>auricapillus</i>	MZUSP24507	M	Brazil	Minas Gerais	R. Doce, barra do Suassuhy
<i>auricapillus</i>	MZUSP24818	M	Brazil	Minas Gerais	R. Doce, baixo Piracicaba (margem direita)
<i>auricapillus</i>	MZUSP82703	NA	Brazil	Minas Gerais	Itacarambi, Volta da Serra
<i>auricapillus</i>	MZUSP82704	NA	Brazil	Minas Gerais	Itacarambi, Volta da Serra
<i>auricapillus</i>	MZUSP82705	NA	Brazil	Minas Gerais	Itacarambi, Volta da Serra
<i>auricapillus</i>	MZUSP82706	NA	Brazil	Minas Gerais	Itacarambi, Volta da Serra
<i>auricapillus</i>	MZUSP28108	M	Brazil	Espírito Santo	R. São José
<i>auricapillus</i>	MZUSP28109	F	Brazil	Espírito Santo	R. São José
<i>auricapillus</i>	MZUSP28110	F	Brazil	Espírito Santo	R. São José
<i>auricapillus</i>	MZUSP34487	M	Brazil	Espírito Santo	R. Itaúnas
<i>auricapillus</i>	MZUSP34490	M	Brazil	Espírito Santo	R. Itaúnas
<i>auricapillus</i>	MZUSP794	F	Brazil	São Paulo	Caconde
<i>auricapillus</i>	MZUSP4490	F	Brazil	São Paulo	Avanhandava
<i>auricapillus</i>	MZUSP4491	M	Brazil	São Paulo	Avanhandava
<i>auricapillus</i>	MZUSP8144	F	Brazil	São Paulo	Ituverava
<i>auricapillus</i>	MZUSP8145	F	Brazil	São Paulo	Ituverava
<i>auricapillus</i>	MZUSP12489	F	Brazil	São Paulo	ValParaíso
<i>auricapillus</i>	MZUSP12492	M	Brazil	São Paulo	ValParaíso
<i>auricapillus</i>	MZUSP12493	M	Brazil	São Paulo	ValParaíso
<i>auricapillus</i>	MZUSP12789	F	Brazil	São Paulo	Faz. Boas Vista, Silvânia
<i>auricapillus</i>	MZUSP26714	F	Brazil	São Paulo	Faz. Varjão, Lins
<i>auricapillus</i>	MZUSP26715	M	Brazil	São Paulo	Faz. Varjão, Lins
<i>auricapillus</i>	MZUSP29091	F	Brazil	São Paulo	Faz. São Miguel, Cajuru
<i>auricapillus</i>	MZUSP29283	M	Brazil	São Paulo	Faz. Palmira, Assis, Rio Paranapanema
<i>auricapillus</i>	MZUSP29284	F	Brazil	São Paulo	Corredeira das Flores, Assis, Rio Paranapanema
<i>auricapillus</i>	MZUSP31251	F	Brazil	São Paulo	R. Paranapanema, Barra Tibagi
<i>auricapillus</i>	MZUSP31252	F	Brazil	São Paulo	R. Paranapanema, Porto Marcondes
<i>auricapillus</i>	MZUSP31461	M	Brazil	São Paulo	Faz. Três Barras, Pitangueiras
<i>auricapillus</i>	MZUSP31462	F	Brazil	São Paulo	Faz. Três Barras, Pitangueiras
<i>auricapillus</i>	MZUSP31463	M	Brazil	São Paulo	Faz. Três Barras, Pitangueiras

<i>auricapillus</i>	MZUSP31464	F	Brazil	São Paulo	Faz. Três Barras, Pitangueiras
<i>auricapillus</i>	MZUSP31465	M	Brazil	São Paulo	Faz. Três Barras, Pitangueiras
<i>auricapillus</i>	MZUSP31466	F	Brazil	São Paulo	Faz. Três Barras, Pitangueiras
<i>auricapillus</i>	MZUSP31467	M	Brazil	São Paulo	Faz. Três Barras, Pitangueiras
<i>auricapillus</i>	MZUSP1809	NA	Brazil	Paraná	Jacarezinho
<i>auricapillus</i>	MZUSP7028	F	Brazil	Paraná	Faz. Monte alegre
<i>auricapillus</i>	MZUSP7029	F	Brazil	Paraná	Faz. Monte Alegre
<i>auricapillus</i>	MZUSP7030	M	Brazil	Paraná	Faz. Monte Alegre
<i>auricapillus</i>	USNM115222	NA	Brazil	Bahia	NA
<i>auricapillus</i>	USNM177633	F	Brazil	Paraná	Jacarezinho
<i>auricapillus</i>	USNM257956	F	Brazil	NA	NA
<i>auricapillus</i>	USNM115221	NA	Brazil	Bahia	NA
<i>auricapillus</i>	LSUMZ65120	F	Brazil	Minas Gerais	Dom Joaquim
<i>auricapillus</i>	LSUMZ65122	F	Brazil	Minas Gerais	Dom Joaquim
<i>auricapillus</i>	LSUMZ65121	M	Brazil	Minas Gerais	Dom Joaquim
<i>auricapillus</i>	LSUMZ65123	M	Brazil	São Paulo	Adolfo
<i>auricapillus</i>	LSUMZ43733	M	Brazil	captivity	NA
<i>auricapillus</i>	FMNH46976	F	Brazil	Bahia	Macaco Secco
<i>auricapillus</i>	FMNH46977	M	Brazil	Bahia	Macaco Secco
<i>auricapillus</i>	FMNH191632	M	Brazil	Minas Gerais	Raul Soares
<i>auricapillus</i>	FMNH191633	M	Brazil	Minas Gerais	Raul Soares
<i>auricapillus</i>	FMNH191634	M	Brazil	Minas Gerais	Raul Soares
<i>auricapillus</i>	FMNH123349	M	Brazil	São Paulo	Município de Luis, Faz. Varjão
<i>auricapillus</i>	FMNH123346	F	Brazil	São Paulo	Município de Luis, Faz. Varjão
<i>auricapillus</i>	FMNH123348	F	Brazil	São Paulo	Município de Luis, Faz. Varjão
<i>auricapillus</i>	FMNH123347	M	Brazil	São Paulo	Município de Luis, Faz. Varjão
<i>auricapillus</i>	FMNH73662	F	Brazil	Paraná	Rio Baile
<i>auricapillus</i>	BMNH90.6.1.50	JUV	Brazil	NA	South East
<i>auricapillus</i>	BMNH95.4.1.425	M	Brazil	Rio de Janeiro	NA
<i>auricapillus</i>	BMNH95.4.1.426	F	Brazil	Rio de Janeiro	NA
<i>auricapillus</i>	BMNH89.1.30.90	M	Brazil	Rio Grande do Sul	Pelotas
<i>auricapillus</i>	BMNH89.1.30.84	NA	Brazil	Bahia	NA
<i>auricapillus</i>	BMNH89.1.30.89	NA	Brazil	Bahia	NA
<i>auricapillus</i>	BMNH90.4.1.22	M	captivity	London	NA
<i>auricapillus</i>	BMNH89.1.30.88	NA	Brazil	Bahia	NA
<i>auricapillus</i>	BMNH90.6.1.49	NA	Brazil	Bahia	NA
<i>auricapillus</i>	BMNH82.1.10.22	NA	Brazil	NA	Upper Amazons
<i>auricapillus</i>	BMNH89.1.30.490	NA	Brazil	NA	NA
<i>auricapillus</i>	BMNH82.1.10.21	NA	Brazil	NA	Upper Amazons
<i>auricapillus</i>	MNHN470	M	Brazil	Goiás	Campo limpo
<i>auricapillus</i>	MNHN490	F	Brazil	NA	NA
<i>auricapillus</i>	MNHN443	F	Brazil	Goiás	Goiânia
<i>auricapillus</i>	MNHN442	F	Brazil	Goiás	Trinidade
<i>jandaya</i>	AMNH474257	M	Brazil	Maranhão	Primeira Cruz
<i>jandaya</i>	AMNH241686	NA	Brazil	Piauí	Corrente

<i>jandaya</i>	AMNH241683	M	Brazil	Piauí	Corrente
<i>jandaya</i>	AMNH241684	F	Brazil	Piauí	Corrente
<i>jandaya</i>	AMNH241685	F	Brazil	Piauí	Corrente
<i>jandaya</i>	AMNH421679	M	Brazil	Maranhão	Tabocas
<i>jandaya</i>	AMNH448113	M	captivity	New York	Central Park Zoo
<i>jandaya</i>	AMNH241687	M	Brazil	Maranhão	São Paulo, Benedito Leite
<i>jandaya</i>	AMNH241682	M	Brazil	Piauí	Corrente
<i>jandaya</i>	AMNH474261	F	Brazil	Piauí	S. Martin
<i>jandaya</i>	AMNH241680	F	Brazil	Maranhão	Tabocas
<i>jandaya</i>	AMNH61399	M	captivity	New York	Central park Zoo
<i>jandaya</i>	AMNH241681	M	Brazil	Piauí	Corrente
<i>jandaya</i>	AMNH174596	F	Brazil	NA	Fazenda do Saco
<i>jandaya</i>	AMNH474262	NA	captivity	England	Tring
<i>jandaya</i>	AMNH474256	M	Brazil	Maranhão	Primeira Cruz
<i>jandaya</i>	AMNH474258	F	Brazil	Maranhão	Primeira Cruz
<i>jandaya</i>	AMNH448112	M	captivity	New York	Central park Zoo
<i>jandaya</i>	AMNH474264	M	NA	NA	NA
<i>jandaya</i>	AMNH174595	M	NA	NA	NA
<i>jandaya</i>	AMNH241678	F	Brazil	Maranhão	Pastos Bons
<i>jandaya</i>	AMNH474263	NA	Brazil	NA	NA
<i>jandaya</i>	MZUSP52356	M	Brazil	Tocantins	Araguatins
<i>jandaya</i>	MZUSP52357	M	Brazil	Tocantins	Araguatins
<i>jandaya</i>	MZUSP52358	M	Brazil	Tocantins	Araguatins
<i>jandaya</i>	MZUSP52359	M	Brazil	Tocantins	Araguatins
<i>jandaya</i>	MZUSP52360	M	Brazil	Tocantins	Araguatins
<i>jandaya</i>	MZUSP52361	M	Brazil	Tocantins	Araguatins
<i>jandaya</i>	MZUSP52362	F	Brazil	Tocantins	Araguatins
<i>jandaya</i>	MZUSP52363	M	Brazil	Tocantins	Araguatins
<i>jandaya</i>	MZUSP6642	F	Brazil	Maranhão	Primeira Cruz
<i>jandaya</i>	MZUSP38132	M	Brazil	Maranhão	Barra do Corda
<i>jandaya</i>	MZUSP81185	F	Brazil	Maranhão	Araguanã
<i>jandaya</i>	MZUSP4332	M	Brazil	Piauí	R. Parnaíba
<i>jandaya</i>	MZUSP4333	F	Brazil	Piauí	R. Parnaíba
<i>jandaya</i>	MZUSP41494	M	Brazil	Ceará	Icarai, Mosquito
<i>jandaya</i>	MZUSP41495	M	Brazil	Ceará	Icarai, Mosquito
<i>jandaya</i>	MZUSP41496	F	Brazil	Ceará	Icarai, Mosquito
<i>jandaya</i>	MZUSP41497	F	Brazil	Ceará	Icarai, Mosquito
<i>jandaya</i>	MZUSP41498	F	Brazil	Ceará	Icarai, Mosquito
<i>jandaya</i>	MZUSP41499	F	Brazil	Ceará	Icarai, Mosquito
<i>jandaya</i>	MZUSP41500	F	Brazil	Ceará	Icarai, Mosquito
<i>jandaya</i>	MZUSP37234	M	Brazil	Alagoas	Mangabeiras, Usina Sinimbú
<i>jandaya</i>	MZUSP37235	F	Brazil	Alagoas	Mangabeiras, Usina Sinimbú
<i>jandaya</i>	MZUSP15750	M	Brazil	Goiás	Barra do Rio São Domingos
<i>jandaya</i>	MZUSP15751	M	Brazil	Goiás	Cana Brava, Nova Roma
<i>jandaya</i>	MZUSP15752	F	Brazil	Goiás	Barra do Rio São Domingos
<i>jandaya</i>	USNM334361	M	captivity	NA	NA

<i>jandaya</i>	USNM487518	F	captivity	NA	NA
<i>jandaya</i>	USNM124788	NA	NA	NA	NA
<i>jandaya</i>	LSUMZ32251	F	Brazil	Goiás	Araguatins
<i>jandaya</i>	FMNH62871	M	Brazil	Maranhão	Tranquiera
<i>jandaya</i>	FMNH355158	F JUV	captivity	Kansas	Busch Gardens
<i>jandaya</i>	FMNH50104	F	Brazil	Maranhão	Primero Cruz
<i>jandaya</i>	FMNH344303	M	Brazil	Goiás	Araguatins
<i>jandaya</i>	FMNH75210	F	Brazil	Goiás	Nova Roma
<i>jandaya</i>	FMNH62869	M	Brazil	Maranhão	Grajahu
<i>jandaya</i>	FMNH62872	F JUV	Brazil	Maranhão	Tranquiera
<i>jandaya</i>	FMNH62868	M	Brazil	Maranhão	Tury-assu
<i>jandaya</i>	FMNH62867	F	Brazil	Maranhão	Tury-assu
<i>jandaya</i>	FMNH62870	M	Brazil	Maranhão	Tranquiera
<i>jandaya</i>	BMNH1913.3.14.43	M	Brazil	Maranhão	Miritiba
<i>jandaya</i>	BMNH1913.3.14.45	F	Brazil	Maranhão	Miritiba
<i>jandaya</i>	BMNH90.6.1.47	M	Brazil	NA	NA
<i>jandaya</i>	BMNH90.6.1.46	NA	Brazil	Pernambuco	NA
<i>jandaya</i>	BMNH1913.3.14.42	M	Brazil	Maranhão	Miritiba
<i>jandaya</i>	BMNH55.12.19.282	NA	captivity	London	NA
<i>jandaya</i>	BMNH1913.3.14.44	M	Brazil	Maranhão	Miritiba
<i>jandaya</i>	BMNH1994.8.8	NA	NA	NA	NA
<i>jandaya</i>	MNHN1163	NA	Brazil	NE	NA
<i>jandaya</i>	MNHN413	M	Brazil	S	NA
<i>jandaya</i>	MNHN563	F	Brazil	NA	NA
<i>jandaya</i>	MNHN666	M	Brazil	NA	NA
<i>maculata</i>	MZUSP10644	M	Brazil	Pará	Santarém
<i>maculata</i>	MZUSP18451	F	Brazil	Pará	Foz do Rio Tapajós
<i>maculata</i>	AMNH474275	F	Brazil	Pará	Rio Maycuru
<i>maculata</i>	AMNH474259	M	Brazil	Pará	Rio Maycuru
<i>maculata</i>	AMNH72028	F	Brazil	NA	NA
<i>maculata</i>	AMNH474260	M	Brazil	Pará	Rio Maycuru
<i>maculata</i>	MZUSP75746	F	Brazil	Pará	Monte Alegre, Colonia do Eréré
<i>maculata</i>	MZUSP75749	F	Brazil	Pará	Monte Alegre, Colonia do Eréré
<i>maculata</i>	MZUSP75748	M	Brazil	Pará	Monte Alegre, Colonia do Eréré
<i>maculata</i>	MZUSP75747	M	Brazil	Pará	Monte Alegre, Colonia do Eréré
<i>maculata</i>	MZUSP75750	M	Brazil	Pará	Monte Alegre, Colonia do Eréré
<i>maculata</i>	FMNH69125	M	Brazil	Para'	Rio Maycuri
<i>solstitialis</i>	AMNH6207	NA	Brazil	NA	NA
<i>solstitialis</i>	AMNH6205	NA	Brazil	NA	NA
<i>solstitialis</i>	AMNH474266	M	British Guiana	NA	Quonga
<i>solstitialis</i>	AMNH474271	M JUV	British Guiana	NA	NA
<i>solstitialis</i>	AMNH474268	M JUV	British Guiana	NA	NA
<i>solstitialis</i>	AMNH474270	M	British Guiana	NA	NA
<i>solstitialis</i>	AMNH474267	F	British Guiana	NA	Quonga
<i>solstitialis</i>	AMNH474274	NA	British Guiana	NA	NA
<i>solstitialis</i>	AMNH474265	M	British Guiana	NA	Annai

<i>solstitialis</i>	AMNH474269	F JUV	British Guiana	NA	NA
<i>solstitialis</i>	MZUSP77939	M	Brazil	Roraima	Boqueirão do Cristal
<i>solstitialis</i>	MZUSP77940	F	Brazil	Roraima	Boqueirão do Cristal
<i>solstitialis</i>	MZUSP6490	NA	British Guiana	NA	NA
<i>solstitialis</i>	USNM614252	M	captivity	NA	NA
<i>solstitialis</i>	USNM612805	M	captivity	NA	NA
<i>solstitialis</i>	USNM623405	M	captivity	NA	NA
<i>solstitialis</i>	USNM145674	M	British Guiana	NA	Quonga
<i>solstitialis</i>	USNM145673	M	British Guiana	NA	Quonga
<i>solstitialis</i>	USNM124711	F	British Guiana	NA	Quonga
<i>solstitialis</i>	USNM145675	M	British Guiana	NA	Quonga
<i>solstitialis</i>	FMNH48999	M	British Guiana	NA	NA
<i>solstitialis</i>	BMNH92.1.16.52	F	British Guiana	NA	Quonga
<i>solstitialis</i>	BMNH92.1.16.54	M	British Guiana	NA	Quonga
<i>solstitialis</i>	BMNH90.6.1.45	F	Brazil	NA	Rio Mahu
<i>solstitialis</i>	BMNH1922.3.5.4628	NA	British Guiana	NA	NA
<i>solstitialis</i>	BMNH92.1.16.51	M	British Guiana	NA	Quonga
<i>solstitialis</i>	BMNH	JUV	NA	NA	NA
<i>solstitialis</i>	BMNH95.11.28.137	F	British Guiana	NA	NA
<i>solstitialis</i>	BMNH92.1.16.60	JUV	British Guiana	NA	Quonga
<i>solstitialis</i>	BMNH92.1.16.59	JUV	British Guiana	NA	Quonga
<i>solstitialis</i>	BMNH92.1.16.58	JUV	British Guiana	NA	Quonga
<i>solstitialis</i>	MNHN465	M	British Guiana	NA	Quonga
<i>solstitialis</i>	MNHN466	M	British Guiana	NA	Quonga
<i>solstitialis</i>	MNHN472	M	British Guiana	NA	Quonga
<i>solstitialis</i>	MNHN470	M	British Guiana	NA	Quonga
<i>solstitialis</i>	MNHN479	M	British Guiana	NA	Quonga
<i>solstitialis</i>	MNHN473	M	British Guiana	NA	Quonga
<i>weddellii</i>	AMNH474296	NA	Brazil	Amazonas, Rio Madeira	Humaytha
<i>weddellii</i>	AMNH239805	NA	Peru	Alto Ucayali	Santa Rosa
<i>weddellii</i>	AMNH239802	NA	Peru	NA	Bira, Rio Uruamba
<i>weddellii</i>	AMNH127338	F	Brazil	NA	Calama, Rio Madeira
<i>weddellii</i>	AMNH237720	NA	Peru	Loreto	Rio Ucayali
<i>weddellii</i>	AMNH791766	F	Bolívia	Dpto. Beni	8 km N of Santa Cruz, Rio Mamoré
<i>weddellii</i>	AMNH474305	F	Bolívia	Santa Cruz	Province of Sara
<i>weddellii</i>	AMNH791768	M	Bolívia	Dpto. Beni	8 km N of Santa Cruz, Rio Mamoré
<i>weddellii</i>	AMNH230865	NA	Brazil	Apayacu	Rio Amazonas
<i>weddellii</i>	AMNH239804	NA	Peru	Alto Ucayali	Santa Rosa
<i>weddellii</i>	AMNH819667	F	Peru	Luisiana	Rio Apurimac, 600 m
<i>weddellii</i>	AMNH819594	M	Peru	Luisiana	Rio Apurimac, 600 m
<i>weddellii</i>	AMNH230861	NA	Peru	Apayacu	Rio Amazonas
<i>weddellii</i>	AMNH230862	NA	Peru	Apayacu	Rio Amazonas
<i>weddellii</i>	AMNH239807	NA	Peru	Alto Ucayali	Santa Rosa
<i>weddellii</i>	AMNH239803	NA	Peru	Alto Ucayali	Santa Rosa
<i>weddellii</i>	AMNH255138	NA	Ecuador	Pastaza	Rio Curaray

weddellii	AMNH474303	F	Bolivia	NA	Province of Sara
weddellii	AMNH239806	NA	Peru	NA	Santa Rosa
weddellii	AMNH474301	M	Bolivia	NA	Province of Sara
weddellii	AMNH136888	M	Bolivia	Cochabamba	Todos Santos, 1300 feet
weddellii	AMNH136890	M	Bolivia	Cochabamba	Todos Santos, 1300 feet
weddellii	AMNH791767	M	Bolivia	Beni	8 km N of Santa Cruz, Rio Mamoré
weddellii	AMNH237719	NA	Peru	NA	Rio Ucayali
weddellii	AMNH474302	M	Bolivia	NA	Province of Sara
weddellii	AMNH136891	F	Bolivia	Cochabamba	Todos Santos, 1300 feet
weddellii	AMNH474306	NA	Ecuador	NA	Napo
weddellii	AMNH819199	M	Bolivia	Beni	pampas del Rio Ubaré ?, 24 km de la boca
weddellii	AMNH181784	M	Peru	Luisiana	Rio Apurimac, Dpto. Cuzco, 1900 feet
weddellii	AMNH44710	NA	Ecuador	NA	Napo
weddellii	AMNH406876	F	NA	NA	Rio Santiago
weddellii	AMNH406877	F	NA	NA	Rio Santiago
weddellii	AMNH791769	F	Bolivia	NA	Beni
weddellii	AMNH474300	F	Brazil	Rondonia	St. Isabel, Rio Preto, Rio Madeira
weddellii	AMNH474304	F	Bolivia	NA	Province of Sara
weddellii	AMNH127339	M	Brazil	Mato Grosso	Tapirapoan, Siputuba River
weddellii	AMNH474297	F	Brazil	NA	Rio Madeira
weddellii	AMNH474298	M	Brazil	NA	Calama, Rio Madeira
weddellii	AMNH230859	NA	Brazil	NA	Porto Indiano, Rio Amazonas
weddellii	AMNH474299	F	Brazil	NA	Jamarizinho, Rio Machados, confl. Of Rio Madeiras
weddellii	AMNH136889	M	Bolivia	Cochabamba	Todos Santos, 1300 feet
weddellii	MZUSP16262	M	Brazil	Amazonas	R. Juruá, João Pessoa
weddellii	MZUSP16263	F	Brazil	Amazonas	R. Juruá, João Pessoa
weddellii	MZUSP20525	F	Brazil	Amazonas	R. Juruá, João Pessoa
weddellii	MZUSP20831	F	Brazil	Amazonas	R. Juruá, João Pessoa
weddellii	MZUSP21299	M	Brazil	Amazonas	R. Juruá, João Pessoa
weddellii	MZUSP21788	M	Brazil	Amazonas	R. Juruá, João Pessoa
weddellii	MZUSP23944	M	Brazil	Amazonas	R. Juruá, João Pessoa
weddellii	MZUSP35592	M	Brazil	Acre	Iquiri
weddellii	MZUSP35593	M	Brazil	Acre	Iquiri
weddellii	MZUSP35594	F	Brazil	Acre	Iquiri
weddellii	MZUSP35595	M	Brazil	Acre	Iquiri
weddellii	MZUSP35596	M	Brazil	Acre	Iquiri
weddellii	MZUSP35597	M	Brazil	Acre	Iquiri
weddellii	MZUSP35598	M	Brazil	Acre	Vila Plácido de Castro, Rio Abunã
weddellii	MZUSP72261	M	Brazil	Acre	Faz. Campo Lindo, Rio Branco
weddellii	MZUSP76371	F	Brazil	Acre	Rio Macauã
weddellii	MZUSP76372	M	Brazil	Acre	Rio Macauã
weddellii	MZUSP76373	M	Brazil	Acre	Rio Macauã
weddellii	MZUSP37924	M	Brazil	Rondônia	Porto Velho, alto Madeira - Guaporé
weddellii	MZUSP37925	M	Brazil	Rondônia	Porto Velho (Rodovia km 8)- alto Madeira - Guaporé

weddellii	MZUSP65919	F	Brazil	Rondônia	R. Anari
weddellii	MZUSP78047	M	Brazil	Mato Grosso	Pontes e lacerda
weddellii	MZUSP2271	M	Bolivia	San Matheo	NA
weddellii	MZUSP64911	F	Peru	Pucallpa	NA
weddellii	USNM55316	NA	Peru	NA	NA
weddellii	USNM16555	NA	Colombia	NA	Bogota
weddellii	USNM310547	F	Bolivia	NA	NA
weddellii	USNM485496	NA	captivity	NA	NA
weddellii	USNM325795	F	captivity	NA	NA
weddellii	LSUMZ70494	F	Ecuador	Napo	Limoncocha
weddellii	LSUMZ33993	F	Peru	Amazonas	Rio Nieva, Kigkis
weddellii	LSUMZ119292	M	Peru	Loreto	Isla Correviento, Rio Amazonas SE Oran, ca 85 km NE Iquitos, 80 m
weddellii	LSUMZ170684	M	Peru	Loreto	86 km SE Juangui on E bank upper Rio Panya
weddellii	LSUMZ170685	F	Peru	Loreto	ca 86 km SE Juanjui on E bank of upper Rio Panya
weddellii	LSUMZ131965	F	Bolivia	Pando	Prov. Nicolas Suarez, 12 km by road Cobija 8 km W on road to Mucden
weddellii	LSUMZ131963	F	Bolivia	Pando	Prov. Nicolas Suarez, 12 km by road Cobija 8 km W on road to Mucden
weddellii	LSUMZ131962	F	Bolivia	Pando	Prov. Nicolas Suarez, 12 km by road Cobija 8 km W on road to Mucden
weddellii	LSUMZ131966	M	Bolivia	Pando	Prov. Nicolas Suarez, 12 km by road Cobija 8 km W on road to Mucden
weddellii	LSUMZ131967	M	Bolivia	Pando	Prov. Nicolas Suarez, 12 km by road Cobija 8 km W on road to Mucden
weddellii	FMNH251547	F	Peru	Cuzco	Hda. Villacarmen
weddellii	FMNH227881	M	Peru	Madre de Dios	Zona Boca Colorado
weddellii	FMNH222882	M	Peru	Cuzco	Cosñipata, Hda. Villa Carmen
weddellii	FMNH251548	M	Peru	Cuzco	Hda. Villacarmen
weddellii	FMNH185555	F	Peru	Yarinacochoa, Rio Ucayali	Loreto
weddellii	FMNH153738	M	Peru	Yarinacochoa, Rio Ucayali	Loreto
weddellii	FMNH275609	M	Peru	Yarinacochoa	Loreto
weddellii	FMNH153739	M	Peru	Yarinacochoa, Rio Ucayali	NA
weddellii	FMNH251546	F	Peru	Cuzco	Hda. Villacarmen
weddellii	FMNH251541	F	Peru	Madre de Dios	Rio Tambopata, Collpa
weddellii	BMNH89.1.30.93	M	Peru	NA	Elvira
weddellii	BMNH89.1.30.94	F	Peru	NA	Elvira
weddellii	BMNH89.1.30.95	NA	Ecuador	Pastaza	Sarayacu
weddellii	BMNH89.1.30.96	NA	Ecuador	Pastaza	Sarayacu
weddellii	BMNH90.6.1.51	NA	Brazil	Pernambuco	NA
weddellii	BMNH46.9.9.39	NA	Bolivia	NA	NA
weddellii	BMNH89.1.30.92	M	Brazil	NA	Eng. Do Gama
weddellii	BMNH90.6.1.52	NA	Brazil	NA	Eng. Do Gama
weddellii	MNHN528	M	Peru	NA	Pucallpa
weddellii	MNHN454	NA	Ecuador	NA	NA

<i>weddellii</i>	MNHN926	F	Ecuador	NA	Quito
<i>weddellii</i>	MNHN3404	M	Peru	NA	Pucallpa
<i>weddellii</i>	MNHN2004_133	NA	NA	NA	NA
<i>weddellii</i>	MNHN925	M	Ecuador	NA	NA
<i>nenday</i>	UMMZ93297	M	Paraguay	NA	Puerto Casado
<i>nenday</i>	AMNH748681	F	Paraguay	NA	NA
<i>nenday</i>	AMNH320769	NA	Paraguay	NA	Chaco, front of Concepcion, 500 feet
<i>nenday</i>	AMNH149395	M	Brazil	Mato Grosso	Descalvados
<i>nenday</i>	AMNH320766	F	Paraguay	NA	Chaco, front of Concepcion, 500 feet
<i>nenday</i>	AMNH474291	NA	Argentina	NA	Gran Chaco
<i>nenday</i>	AMNH129291	F	captivity	NA	N.Y. Zoological Society
<i>nenday</i>	AMNH474287	NA	Argentina	NA	Chaco Austral. Rio de Oro
<i>nenday</i>	AMNH320767	F	Paraguay	NA	Chaco, front of Concepcion, 500 feet
<i>nenday</i>	AMNH474289	NA	Argentina	NA	Chaco Austral. Rio de Oro
<i>nenday</i>	AMNH474294	NA	NA	NA	NA
<i>nenday</i>	AMNH474290	NA	Argentina	NA	Kolonie Alfonso. Formosa. Gran Chaco.
<i>nenday</i>	AMNH474288	NA	Argentina	NA	Chaco Austral. Rio de Oro
<i>nenday</i>	AMNH300587	M	captivity	NA	cage bird
<i>nenday</i>	AMNH474293	NA	Paraguay	NA	NA
<i>nenday</i>	AMNH474292	NA	Paraguay	NA	NA
<i>nenday</i>	AMNH320768	NA	Paraguay	NA	Chaco, front of Concepcion, 500 feet
<i>nenday</i>	AMNH149397	M	Paraguay	NA	Fort Wheeler. Paraguayan Chaco
<i>nenday</i>	AMNH320770	NA	NA	NA	NA
<i>nenday</i>	AMNH748684	F	NA	NA	NA
<i>nenday</i>	AMNH474295	NA	Paraguay	NA	NA
<i>nenday</i>	MZUSP12239	M	Brazil	Mato Grosso do Sul	Porto Esperança
<i>nenday</i>	MZUSP12296	M	Brazil	Mato Grosso do Sul	Porto Esperança
<i>nenday</i>	MZUSP12325	F	Brazil	Mato Grosso do Sul	Porto Esperança
<i>nenday</i>	MZUSP18279	F	Brazil	Mato Grosso do Sul	Salobra
<i>nenday</i>	MZUSP81199	F	Brazil	Mato Grosso do Sul	Faz. Caiman, Miranda
<i>nenday</i>	MZUSP42861	F	Brazil	São Paulo	Faz. Sta. Ernestina, Taquaretinga
<i>nenday</i>	MZUSP2113	NA	Paraguay	NA	NA
<i>nenday</i>	USNM145676	NA	Paraguay	NA	NA
<i>nenday</i>	USNM283748	M	Paraguay	NA	Puerto Pinasco
<i>nenday</i>	USNM311893	M	captivity	Natural Zoological Park	NA
<i>nenday</i>	USNM16410	NA	Brazil	NA	NA
<i>nenday</i>	USNM283749	M	Paraguay	NA	Puerto Pinasco
<i>nenday</i>	USNM399457	M	NA	NA	NA
<i>nenday</i>	USNM399456	F	NA	NA	NA
<i>nenday</i>	USNM127073	NA	Paraguay	NA	NA
<i>nenday</i>	LSUMZ73255	M	Argentina	Formosa	Espinillo
<i>nenday</i>	LSUMZ73253	M	Argentina	Formosa	Espinillo

<i>nenday</i>	LSUMZ73254	M	Argentina	Formosa	Espinillo
<i>nenday</i>	LSUMZ73252	M	Argentina	Formosa	Espinillo
<i>nenday</i>	FMNH152837	M	Paraguay	Chaco	Puerto Casado
<i>nenday</i>	FMNH190421	M	NA	NA	NA
<i>nenday</i>	FMNH152838	M	Paraguay	Chaco	Puerto Casado
<i>nenday</i>	FMNH152839	F	Paraguay	Chaco	Puerto Casado
<i>nenday</i>	FMNH185159	M	Paraguay	NA	NA
<i>nenday</i>	FMNH155821	M	Paraguay	NA	NA
<i>nenday</i>	FMNH155820	F	Paraguay	Chaco	NA
<i>nenday</i>	FMNH155408	F	NA	NA	NA
<i>nenday</i>	FMNH185160	F	Paraguay	NA	NA
<i>nenday</i>	FMNH371846	F	captivity	Florida	Parrot Jungle
<i>nenday</i>	BMNH95.9.8.132	F	Paraguay	NA	Rio Pilcomayo
<i>nenday</i>	BMNH90.6.1.44	NA	Argentina	NA	Buenos Aires
<i>nenday</i>	BMNH38.12.18.25	NA	Paraguay	NA	NA
<i>nenday</i>	BMNH95.9.8.133	NA	Paraguay	NA	Rio Pilcomayo
<i>nenday</i>	BMNH95.9.8.131	M	Paraguay	NA	Rio Pilcomayo

Appendix 2. List of examined skeletons, where “NA” refers to missing data.

Taxon	N°	Sex	observations	Locality/Donor
<i>auricapillus</i>	MZUSP90429	F		NA
<i>auricapillus</i>	MZUSP89250	F		NA
<i>auricapillus</i>	LSUMZ164606	M	captivity	Clarence Killian Aviary, Mc Kinney, Texas.
<i>auricapillus</i>	FMNH342703	NA	captivity	Busch Gardens
<i>jandaya</i>	USNM321850	M	captivity	Natural Zoological Park
<i>jandaya</i>	USNM344704	F	captivity	Natural Zoological Park
<i>jandaya</i>	USNM322098	M	captivity	Natural Zoological Park
<i>jandaya</i>	MZUSP89249	NA		NA
<i>jandaya</i>	MZUSP89268	M		NA
<i>jandaya</i>	AMNH9232	NA	captivity	Texas, Houston (R.Berry)
<i>jandaya</i>	AMNH3684	NA	captivity	New York, Zoological Park
<i>jandaya</i>	AMNH2399	M		NA
<i>jandaya</i>	AMNH9233	F	captivity	Texas, Houston (R.Berry)
<i>jandaya</i>	LSUMZ149161	F	captivity	Rick Jordan Aviary, Dripping Springs, Texas
<i>jandaya</i>	FMNH337783	M	captivity	A. Moorhouse
<i>jandaya</i>	FMNH454877	NA	captivity	NA
<i>jandaya</i>	FMNH360309	F	captivity	Busch Gardens
<i>jandaya</i>	FMNH337780	M	captivity	NA
<i>jandaya</i>	BMNHs/1981.31.8	F	captivity	Burton

<i>solstitialis</i>	USNM343432	NA	captivity	Natural Zoological Park
<i>solstitialis</i>	USNM614252	M	captivity	NA
<i>solstitialis</i>	USNM612805	M	captivity	NA
<i>solstitialis</i>	USNM623405	M	captivity	NA
<i>solstitialis</i>	AMNH21070	M	captivity	Bird Jungle
<i>solstitialis</i>	AMNH13706	NA	captivity	Novak's Aviary, Guyana
<i>solstitialis</i>	LSUMZ166424	F	captivity	Rick Jorda Aviary, Kutztown, Pennsylvania
<i>solstitialis</i>	LSUMZ166423	F	captivity	Rick Jorda Aviary, Kutztown, Pennsylvania
<i>solstitialis</i>	LSUMZ111755	F	captivity	Audubon Park Zoo, New Orleans, Louisiana
<i>solstitialis</i>	LSUMZ166422	M	captivity	Rick Jorda Aviary, Kutztown, Pennsylvania
<i>solstitialis</i>	FMNH360310	F	captivity	Busch Gardens
<i>solstitialis</i>	FMNH342705	F	captivity	Busch Gardens
<i>solstitialis</i>	FMNH347538	NA	captivity	Brookfield Zoo
<i>solstitialis</i>	FMNH337781	M	captivity	Busch Gardens
<i>solstitialis</i>	BMNHs/2013.25.3	NA	captivity	G. Smith
<i>solstitialis</i>	BMNHs/1989.29.2	M	captivity	G. Smith
<i>solstitialis</i>	BMNHs/1983.5.2	NA	captivity	G. Smith
<i>weddellii</i>	USNM322311	F	captivity	Natural Zoological Park
<i>weddellii</i>	USNM291690	F		Bolivia
<i>weddellii</i>	USNM319983	F	captivity	Natural Zoological Park
<i>weddellii</i>	USNM345865	F		Tres Barras, Rio Paraguay, Brazil
<i>weddellii</i>	USNM345866	M		Barras das Bughres & Caceres, Brazil
<i>weddellii</i>	USNM345864	F		Tres Barras, Rio Paraguay, Brazil
<i>weddellii</i>	USNM345863	M		Tres Barras, Rio Paraguay, Brazil
<i>weddellii</i>	LSUMZ52681	F		Dpto. Loreto, rio Caranaja, Balta, Peru.
<i>weddellii</i>	LSUMZ131427	M		Dpto. Pando, Prov. Nicolas Suarez, ca 12 km by road S Cabija, ca 8 km W on road to Mucden, 325 m, Bolivia.
<i>weddellii</i>	LSUMZ160337	F	captivity	Ed Luber Aviary
<i>weddellii</i>	LSUMZ52682	M		Dpto. Loreto, rio Caranaja, Balta, Peru.
<i>weddellii</i>	FMNH315170	M		Hda. Amazonia, Madre de Dios, Peru
<i>weddellii</i>	FMNH320429	NA		Hda. Amazonia, Madre de Dios, Peru
<i>weddellii</i>	FMNH315169	F		Hda. Amazonia, Madre de Dios, Peru
<i>weddellii</i>	FMNH337784	M	captivity	National Zool Park
<i>nenday</i>	AMNH16514	M	captivity	D.Neibling
<i>nenday</i>	MZUSP90426	M		NA
<i>nenday</i>	MZUSP89327	NA		NA
<i>nenday</i>	USNM345868	M		Bt. Caceres & Concepcion, Brazil.

<i>nenday</i>	USNM345869	M		Bt. Caceres & Concepcion, Brazil.
<i>nenday</i>	USNM292864	M	trunk	Natural Zoological Park
<i>nenday</i>	USNM291978	F	captivity	Natural Zoological Park
<i>nenday</i>	LSUMZ99596	F	captivity	Baton Rouge Zoo, Louisiana
<i>nenday</i>	LSUMZ81626	M	captivity	Baton Rouge Zoo, Louisiana
<i>nenday</i>	FMNH313394	NA	captivity	NA
<i>nenday</i>	FMNH313417	M	captivity	Busch Garderns
<i>nenday</i>	FMNH337798	F	captivity	Busch Garderns
<i>nenday</i>	FMNH337799	M	captivity	Busch Garderns

Appendix 3. Morphological characters examined for species of the genus *Aratinga*, coded according to the catalogue of Smithe.

Character	<i>A. solstitialis</i>	<i>A. maculata</i>	<i>A. jandaya</i>	<i>A. auricapillus</i>	<i>A. nenday</i>	<i>A. weddellii</i>
Bill	Sepia 119	Sepia 119	Sepia 119	Sepia 119	Sepia 119	Sepia 119
Tarsus	Sepia 119	Sepia 119	Sepia 119	Sepia 119	Beige 219D	Sepia 119
Periophthalmic ring	Sepia 119	Sepia 119	Sepia 119	Sepia 119	Sepia 119	White
Area around eye	Chrome Orange 16	Chrome Orange 16	Chrome Orange 16	Chrome Orange 16	Jet Black 89	Pratt's Payne's Gray 88
Forehead	Chrome Orange 16	Chrome Orange 16	Chrome Orange 16	Chrome Orange 16	Jet Black 89	Pratt's Payne's Gray 88
Crown	Orange Yellow 18 mixed with Chrome Orange 16	Orange Yellow 18	Orange Yellow 18	Orange Yellow 18 mixed with Chrome Orange 16	Jet Black 89/ Jet Black 89 with Flame Scarlet 15	Pratt's Payne's Gray 88
Nape	Orange Yellow 18 mixed with Chrome Orange 16	Orange Yellow 18 with Parrot Green 260	Orange Yellow 18	Parrot Green 260	Jet Black 89 with some Flame Scarlet 15 and Lime Green 159/ Turquoise green 64 and Lime Green 159	Pratt's Payne's Gray 88
Cheeks	Chrome Orange 16	Chrome Orange 16	Orange Yellow 18	Parrot Green 260	Jet Black 89/ Jet Black 89 with Flame Scarlet 15	Pratt's Payne's Gray 88
Auriculars	Chrome Orange 16	Chrome Orange 16	Orange Yellow 18 mixed with Chrome Orange 16	Lime Green 159 with Flame Scarlet 15/ Lime Green 159	Jet Black 89	Pratt's Payne's Gray 88
Upper throat	Orange Yellow 18 mixed with Chrome Orange 16	Orange Yellow 18	Orange Yellow 18 mixed with Chrome Orange 16	Lime Green 159	Jet Black 89/ Jet Black 89 with Flame Scarlet 15	Pratt's Payne's Gray 88
Throat	Orange Yellow 18 mixed with Chrome Orange 16	Orange Yellow 18	Orange Yellow 18	Lime Green 159	Turquoise Green 64	Pratt's Payne's Gray 88
Dorsal neck	Orange Yellow 18	Orange Yellow 18 with Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260

Character	<i>A. solstitialis</i>	<i>A. maculata</i>	<i>A. jandaya</i>	<i>A. auricapillus</i>	<i>A. nenday</i>	<i>A. weddellii</i>
Scapulars	Orange Yellow 18 mixed with Chrome Orange 16	Orange Yellow 18 with Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Lesser underwing-coverts	Orange Yellow 18	Orange Yellow 18 with Parrot Green 260	Parrot Green 260 and Flame Scarlet 15 mixed with Orange Yellow 18	Parrot Green 260 and Flame Scarlet 15	Lime Green 159	Lime Green 159
Bend of wing	Orange Yellow 18	Orange Yellow 18 with Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Lesser wing-coverts	Orange Yellow 18	Orange Yellow 18 with Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Median wing-coverts	Parrot Green 260 with some Orange Yellow 18	Orange Yellow 18 with Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Gr. Primary coverts	Indigo Blue 173	Indigo Blue 173	Indigo Blue 173	Indigo Blue 173	Indigo Blue 173	Indigo Blue 173
Gr. Secondary coverts	Parrot Green 260 with some Orange Yellow 18	Parrot Green 260 with some Orange Yellow 18	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Folded secondaries	Parrot Green 260 with some Orange Yellow 18	Parrot green 260 with some Orange Yellow 18	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Rump	Orange Yellow 18 mixed with Chrome Orange 16	Orange Yellow 18 mixed with Parrot Green 260 and Chrome Orange 16	Lime Green 159 with Flame Scarlet 15	Lime Green 159 with Flame Scarlet 15	Lime Green 159	Lime Green 159
Breast	Chrome Orange 16	Orange Yellow 18 with some Parrot Green 260	Flame Scarlet 15 with some Lime Green 159	Lime Green 159 with Flame Scarlet 15	Lime Green 159	Parrot Green 260
Belly	Chrome Orange 16	Orange Yellow 18 mixed with Chrome Orange 16	Flame Scarlet 15	Flame Scarlet 15 with Lime Green 159	Lime Green 159	Lime Green 159
Crural feathers	Orange Yellow 18 mixed with Chrome Orange 16	Orange Yellow 18 with Parrot Green 260	Flame Scarlet 15 with some Lime Green 159	Lime Green 159	Flame Scarlet 15	Lime Green 159
Primaries	Parrot Green 260 Indigo Blue 173, and Jet Black 89	Parrot Green 260 Indigo Blue 173, and Jet Black 89	Parrot Green 260 Indigo Blue 173, and Jet Black 89	Parrot Green 260 Indigo Blue 173, and Jet Black 89	Parrot Green 260 Indigo Blue 173, and Jet Black 89	Parrot Green 260 Indigo Blue 173, and Jet Black 89
Secondaries	Parrot Green 260 mixed with Orange Yellow 18 and Indigo Blue 173	Parrot Green 260 mixed with Orange Yellow 18 and Indigo Blue 173	Parrot Green 260 Indigo Blue 173, and Jet Black 89	Parrot Green 260 Indigo Blue 173, and Jet Black 89	Parrot Green 260 Indigo Blue 173, and Jet Black 89	Parrot Green 260 Indigo Blue 173, and Jet Black 89
Underwing-coverts	Brownish Olive 29	Brownish Olive 29	Brownish Olive 29	Brownish Olive 29	Brownish Olive 29	Brownish Olive 29
Uppertail	Olive-green 46 with Indigo Blue 173, Jet Black 89 tips	Olive-green 46 with Indigo Blue 173, Jet Black 89 tips	Olive-green 46 with Indigo Blue 173, Jet Black 89 tips	Olive-green 46 with Indigo Blue 173, Jet Black 89 tips	Olive-green 46 with Indigo Blue 173, Jet Black 89 tips	Olive-green 46 with Indigo Blue 173, Jet Black 89 tips
Undertail	Brownish Olive 29	Brownish Olive 29	Brownish Olive 29	Brownish Olive 29	Brownish Olive 29	Brownish Olive 29

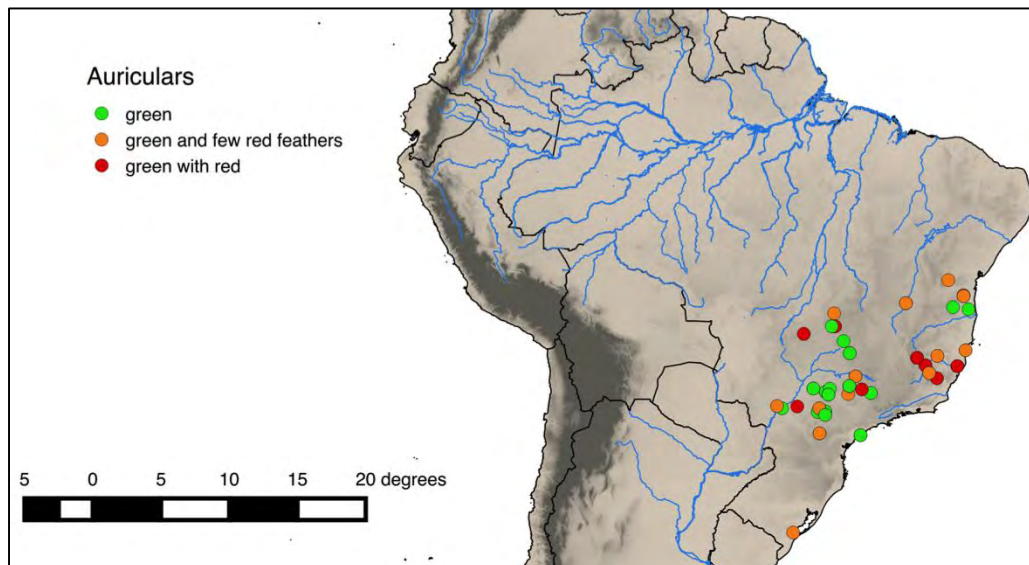
Appendix 4. List of osteological characters examined, with reference to the author, when the character was taken from the literature.

Character	Character state	Author
orbit	complete/incomplete	Machado <i>et al.</i> 2006, Alvarenga 2007, Tokita 2003, Tokita <i>et al.</i> 2007
<i>proc. zygomaticus</i> length	short/medium	Machado <i>et al.</i> 2006, Gaban-Lima 2007
<i>proc. zygomaticus</i> shape	rounded/pointed	
<i>proc. lacrimalis</i> shape	rounded/pointed	
ridge on <i>fossa temporalis</i>	present/absent	
deep <i>fossa temporalis</i>	present/absent	
marked foramina in the supraorbital region	present/absent	
marked <i>crista nuchalis transversa</i>	present/absent	
<i>crista nuchalis transversa</i> shape	M/reverse U	Brito 2008
<i>crista nuchalis transversa</i> reaching the <i>proc. paraoccipitalis</i>	present/absent	
<i>proc. paraoccipitalis</i> shape	rounded/pointed	Brito 2008
ridge on <i>ala parasphenoidalis</i>	present/absent	
<i>arcus suborbitalis</i> touching the <i>arcus jugalis</i>	present/absent	
<i>fenestra antorbitalis</i> shape	rounded/triangular	
lacrimal almost closing the antorbital fenestra	present/absent	
<i>rostrum maxillae</i> shape	isosceles triangle/equilateral triangle	
<i>proc. retroarticularis</i> shape	triangular obtuse/ triangular acute	Gaban-Lima 2007
indent on median portion of the <i>proc. orbitalis</i> of the lacrimal	present/absent	Brito 2008
<i>foramen pneumaticum palatini</i> size	small/large	
space between <i>os maxillare</i> and <i>os palatinum</i>	present/absent	
notch on region of the <i>os maxillare</i>	present/absent	
contact region between the pterygoid and caudal portion of <i>os palatinum</i>	present/absent	
<i>crista</i> of the median portion of <i>os palatinum</i> touching the pterygoid	present/absent	
<i>fenestra caudalis mandibulae</i> presence	present/absent	Gaban-Lima 2007
<i>fenestra rostralis mandibulae</i> presence	present/absent	Gaban-Lima 2007
<i>proc. medialis mandibulae</i> shape	pointed/rounded	Gaban-Lima 2007
<i>foramen obturatum</i>	open/closed	
<i>ala preacetabularis ilii</i> shape	rounded/pointed	
prominent <i>tuberculum preacetabulare</i>	present/absent	
<i>sutura iliosynsacralis</i> shape	open/closed	
<i>proc. marginis caudalis</i> shape	rounded/pointed	
<i>spina externa rostri</i> shape	thick/thin	
<i>proc. craniolateralis</i> shape	rounded/pointed	
<i>apex carinae</i> shape	rounded/pointed	

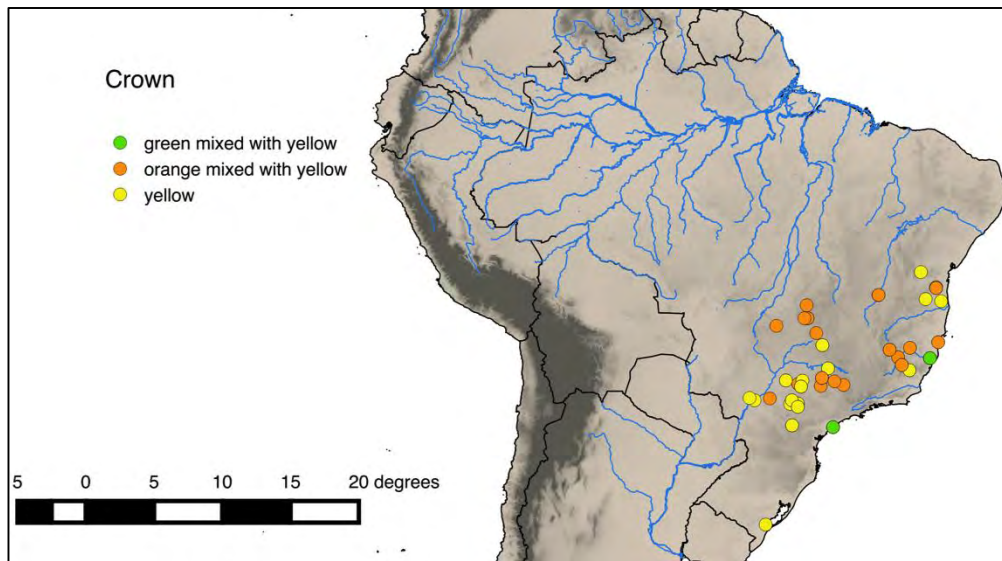
Character	Character state	Author
<i>tuberculum cristae medianae</i>	present/absent	
<i>pila coracoidea</i> with V shape	present/absent	
<i>margo caudalis</i> shape	triangular/squared	
prominent <i>tuberculum supracondylare ventrale</i>	present/absent	
<i>pons supratendineus</i> ossification	completely ossified/incompletely ossified	Mayr 2010
<i>spina fibulae</i> ending at <i>crista fibularis</i> level	present/absent	

Appendix 5. Mapped character states of auriculars **(A)** and crown **(B)** coloration in *A. a. auricapillus* and *A. a. aurifrons* showing that they do not present significant differences in plumage.

(A) Auriculars coloration. Green: Lime Green 159, orange: Lime Green 159 with few Flame Scarlet 15 feathers, red: Lime Green 159 with Flame Scarlet 15.



(B) Crown coloration. Green: Lime Green 159 mixed with Orange Yellow 18, orange: Chrome Orange 16 mixed with Orange Yellow 18, yellow: Orange Yellow 18.



Appendix 6. Pairwise comparisons between *A. a. auricapillus* and *A. a. aurifrons* using Wilcoxon rank sum test for 4 morphometric parameters. Ns = no significant difference, <0.05 = significant difference.

Taxa	Culmen	Bill width	Wing	Tarsus
<i>auricapillus - aurifrons</i>	Ns	Ns	0.038	Ns

Capítulo 2

Morphology, plumage variation and taxonomy of the representatives of the genus *Eupsittula* Bonaparte, 1853
(Aves: Psittacidae)

Abstract

The genus *Eupsittula* Bonaparte, 1853 currently includes five polytypic species of parakeets that range from Central to South America. Their representants have historically been included in broader genera due to the presence of long pointed-tail and mostly green plumage. Moreover, several taxonomic arrangements and new races have been proposed often without providing any rational or based on comparison with few other taxa. Therefore, a taxonomic revision, including all taxa reported in the literature for the genus *Eupsittula*, was performed in order to understand morphological variation within the group and clarify their current distribution, since their range has often been misunderstood. The analysis of plumage and morphometrics revealed the existence of 15 valid species according to the Phylogenetic Species Concept. In particular, within the *E. canicularis* complex only *E. canicularis*, out of the three races traditionally suggested, was considered valid. Moreover, within the *E. nana* complex, *E. astec* and *E. nana* were considered distinct species, whereas *E. astec vicinalis* Bangs & Penard, 1919 was considered a junior synonym of *E. astec* (Souancé, 1857). The *E. pertinax* complex, traditionally including 14 races occurring in the northern part of South America, was reduced to 10 valid species: *E. pertinax*, *E. ocularis*, *E. arubensis*, *E. xanthogenia*, *E. tortugensis*, *E. aeruginosa*, *E. margaritensis*, *E. chrysophrys*, *E. surinama* and *E. paraensis*. Also, we demonstrated that *E. aurea major* Cherrie & Reichenberger, 1923 represents a junior synonym of *E. aurea* (Gmelin, 1788). Finally, our analysis suggested that the São Francisco River does not constitute a geographical barrier for the two races *E. cactorum cactorum* (Kuhl, 1820) and *E. c. caixana* (Spix, 1824), but the latter should be considered a junior synonym of *E. cactorum*.

Resumo

O gênero *Eupsittula* Bonaparte, 1853 atualmente inclui cinco espécies politípicas de periquitos distribuídos desde o Centro até o Sul da América. Seus representantes foram historicamente incluídos em gêneros mais amplos, devido à presença de cauda longa e pontiaguda, e plumagem predominantemente verde. Vários arranjos taxonômicos e novas raças têm sido propostos, muitas vezes sem justificativa ou com base na comparação com poucos outros táxons. Fizemos uma revisão taxonômica incluindo todos os táxons reportados na literatura para o gênero *Eupsittula*, a fim de compreender a variação morfológica dentro do grupo e esclarecer sua distribuição atual, a qual foi muitas vezes confundida pelos autores. A análise de plumagem e morfometria revelou a existência de 15 espécies válidas de acordo com o Conceito Filogenético de Espécie. Em particular, dentro do complexo *E. canicularis*, só *E. canicularis*, entre as três subespécies tradicionalmente reconhecidas, foi considerada válida. Além disso, dentro do complexo *E. nana*, *E. nana* e *E. astec* foram consideradas espécies distintas, enquanto que *E. astec vicinalis* Bangs & Penard, 1919 foi considerado um sinônimo júnior de *E. astec* (Souancé, 1857). O complexo *E. pertinax*, que tradicionalmente inclui 14 subespécies que ocorrem na parte norte da América do Sul, foi reduzido para 10 espécies válidas: *E. pertinax*, *E. ocularis*, *E. arubensis*, *E. xanthogenia*, *E. tortugensis*, *E. aeruginosa*, *E. margaritensis*, *E. chrysophrys*, *E. surinama* e *E. paraensis*. Além disso, demonstramos que *E. aurea major* Cherrie & Reichenberger, 1923 representa um sinônimo júnior de *E. aurea* (Gmelin, 1788). Finalmente, nossa análise sugere que o Rio São Francisco não constitui uma barreira geográfica para *E. cactorum cactorum* (Kuhl, 1820) e *E. c. caixana* (Spix, 1824), sendo que o último deve ser considerado um sinônimo júnior de *E. cactorum*.

Morphology, plumage variation and taxonomy of the representatives of the genus *Eupsittula* Bonaparte, 1853 (Aves: Psittacidae)

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1. INTRODUCTION

The genus *Eupsittula* Bonaparte, 1853 currently includes 5 polytypic species of neotropical parakeets (*canicularis*, *nana*, *pertinax*, *aurea*, *cactorum*) that range from Central to South America and are characterized by relatively small size, grayish or olive breast plumage, and rectrices that are mostly green with blue distal portion and black edges. Their representants have historically been included in broader genera of parakeets, mainly due to the presence of long pointed-tail and mostly green plumage. Moreover, all aforementioned species have been considered polytypic by the majority of authors and several taxonomic arrangements have been proposed without a revision of all available taxa.

Salvadori (1891) grouped *canicularis*, *cactorum*, *nanus*, *aztec*, *aeruginosus*, *ocularis* and *pertinax* in the broader genus *Conurus*. Ridgway (1916), based on plumage coloration and bill morphology, placed *canicularis*, *ocularis* and *pertinax* in the genus *Eupsittula*. He first considered *E. pertinax* as a polytypic taxon, diagnosed by distinctly outlined and with paler shaft-streaks feathers on auricular region, including *E. p. pertinax*, *E. p. xanthogenia*, *E. p. tortugensis*, *E. p. arubensis* and *E. p. aeruginosus*. Cory (1918) followed Ridgway, but recognized two more races of *E. pertinax* (*E. p. chrysophrys* and *E. p. margaritensis*) and included *E. astec* in the genus, without providing any rationale. Peters (1937), with no justification for his treatment, placed *astec*, *nana*, *canicularis*, *pertinax*, *cactorum* and *aurea* in the genus *Aratinga*. Furthermore, he recognized two races of *A. astec* (*A. a. astec* and *A. a. vicinalis*), two of *A. canicularis* (*A. c. canicularis* and *A. c. eburnirostrum*), two of *A. cactorum* (*A. c. cactorum* and *A. c. caixana*), two of *A. aurea* (*A. a. aurea* and *A. a. major*), and eighth subspecies within *A. pertinax* (*A. p. pertinax*, *A. p. ocularis*, *A. p. aeruginosa*, *A. p. tortugensis*, *A. p. margaritensis*, *A. p. chrysophrys*, *A. p. xanthogenia* and *A. p. arubensis*). This classification has been followed by all subsequent authors (Arndt 1981; Forshaw 1989; Collar 1997; Juniper & Parr 1998; Forshaw 2010), however, new races and different taxonomic combinations have been proposed for some of the taxa.

For instance, Arndt (1981) recognized four subspecies within *A. astec* (*A. a. astec*, *A. a. vicinalis*, *A. a. melloni* and *A. a. nana*), three of *A. canicularis* (*A. c. canicularis*, *A. c. eburnirostrum* and *A. c. clarae*), two of *A. aurea* (*A. a. aurea* and *A. a. major*), two of *A. cactorum* (*A. c. cactorum* and *A. c. caixana*), and fourteen within *A. pertinax* (*A. p. pertinax*, *A. p. xanthogenia*, *A. p. aeruginosa*, *A. p. arubensis*, *A. p. lehmanni*, *A. p. tortugensis*, *A. p. griseipecta*, *A. p. margaritensis*, *A. p. venezuelae*, *A. p. chrysophrys*, *A. p. surinama*, *A. p. chrysogenys*, *A. p. paraensis* and *A. p. ocularis*). On the other hand, some authors (Forshaw 1989; Collar 1997; Juniper & Parr 1998; Forshaw 2010) considered *A. nana* as a separate polytypic species including only *A. n. nana*, *A. n. astec* and *A. n. vicinalis*. Also, Collar (1997) did not recognize *A. a. major* as a valid taxon, but considered it a south population of a cline of increasing size within *A. aurea*.

The first authors to suggest that the aforementioned taxa could be separate from the genus *Aratinga* were Silveira *et al.* (2005). Particularly, they suggested that the *A. pertinax* group (*A. pertinax*, *A. aurea*, *A. nana*, *A. canicularis* and *A. cactorum*) includes relatively small-sized parakeets, with gray or horny bill, olive brown or grayish upper breast, blue-green remiges and rectrices dorsally green with blue tip. Finally, Remsen *et al.* (2013), based on plumage analysis and comparisons with molecular published phylogenies, agreed with Silveira *et al.* (2005) and proposed that these five taxa be placed in the resurrected genus *Eupsittula* Bonaparte, 1853.

No author has ever performed a detailed revision of all taxa included in the *A. pertinax* group, in order to test all morphological differences reported in the literature and verify which taxa can be considered valid. In fact, both molecular and morphological studies have included only some of the taxa and simply followed previous classifications with no rationale for their treatment. Therefore, this study aims to perform a taxonomic revision including all taxa reported in the literature for the genus *Eupsittula*, in order to understand the morphological variation within the group and clarify their current distribution, since their range has often been misunderstood.

2. MATERIALS AND METHODS

A total of 897 specimens of *Eupsittula* (Appendix 1) were examined in the following institutions: Museu de Zoologia da Universidade de São Paulo (MZUSP), São Paulo, Brazil; American Museum of Natural History (AMNH), New York, USA; Smithsonian Institution National Museum of Natural History (USNM), Washington, USA; Field Museum of Natural History (FMNH), Chicago, USA; Louisiana Museum of Natural History (LSUMZ), Baton Rouge, USA; Natural History Museum (BMNH), Tring, UK; Muséum National d'Histoire Naturelle (MNHN), Paris, France. Twelve type

specimens were analyzed using high-quality photos: one from the Museum of Comparative Zoology (MCZ), Harvard University, Boston, USA; two from the Academy of Natural Sciences of Philadelphia (ANSP), Philadelphia, USA; two from the Carnegie Museum of Natural History (CMNH), Pittsburgh, USA; one from the Moore Laboratory of Zoology (MLZ), Los Angeles, USA; three from the Museum für Naturkunde (ZMB), Berlin, Germany; and three from the Museu Nacional do Rio de Janeiro (MNRJ), University of Rio de Janeiro, Brazil.

Measurements and photos were taken for each single specimen analyzed. Also, all information attached to the specimens, such as museum catalogue number, sex, locality, date and collector, was recorded. Plumage coloration was described using the terminology of Smithe (1975) and Forshaw (2010). It is worth noting that bill, periophthalmic ring and tarsus coloration was codified after examination of alive individuals' photos. Juveniles were identified through incomplete plumage coloring and bill displaying soft areas on the sides of the maxilla (Arndt 2006), and excluded from morphometric analyses. Measurements of exposed culmen without cere, width at base of bill, tarsu-metatarsus, tail and wing chord were obtained for 886 individuals, including captured or captive bred birds, since their exclusion did not change analyses results. Measurements were taken with a digital caliper with a precision of 0.05 mm and a ruler (precision 0.5 mm), according to Baldwin *et al.* (1931). Rectrice measurements were discarded due to the large amount of specimens exhibiting damaged tail. Moreover, 80 skeletons of *Eupsittula* (Appendix 2) were analyzed. Those specimens that could not be identified at species level, lacking locality information or being captive bred birds, were excluded from further analyses. Osteological and morphological characters, described according to Baumel *et al.* (1993) and Sereno (2007), were used to propose a phylogenetic hypothesis for the genus *Aratinga* sensu Peters (1937) (Ferraroni & Silveira in prep.).

In order to assess differences in body size statistical analyses, using a significance level of 0.05, were performed in R 3.0.2 (R Core Team 2013), and included Shapiro-Wilk normality test and Fligner-Killeen Test for homogeneity. To test for sexual dimorphism Kruskal-Wallis and Wilcoxon test were performed; whereas for morphometric differences we used Kruskal-Wallis and Wilcoxon rank sum test for multiple comparisons between pairs of taxa. Finally, we performed a principal component analysis (PCA), transforming initial measurements prior to analysis, in order to eliminate the effect of shape and size.

The criterion adopted for identifying and delimiting taxonomic units was diagnosability. Characters were selected to find fully diagnosable clusters of individuals sharing similar

morphology. These clusters were, after analysis, considered species following the Phylogenetic Species Concept (Nelson & Platnik 1981; Cracraft 1983, 1987, 1989; McKittrick & Zink 1988).

Characters and specimens locality (obtained for 759 individuals) were mapped using QuantumGIS 2.0.1-Dufour (2013). Geographical coordinates were obtained using ornithological gazetteers (Paynter Jr 1982, 1989, 1992, 1995, 1997; Stephens & Taylor 1983, 1985; Paynter Jr & Taylor Jr 1991a, 1991b; Vanzolini 1992) or, when not available in the literature, from the following websites: <http://www.fallingrain.com>, <http://www.geographic.org>, <http://www.maplandia.com> and <http://www.wikimapia.com>. Also, photos found on websites such as <http://wikiaves.com.br> and <http://ibc.lynxeds.com> were used to confirm the current distribution of taxa. Finally, the list of synonyms includes all names considered applicable to the examined taxa after the analysis of morphology. Some vernacular names were included, when used as base for other descriptions. Moreover, were included erroneously spelled names, changes of combination and changes of taxonomic level. When the same name was cited by more than one author, only the first was included in the list.

3. RESULTS AND DISCUSSION

3.1 Morphological characters

A total of 17 out of the 31 morphological characters examined (Appendix 3) support the genus *Eupsittula* Bonaparte. These characters states were: (1) tarsus: Sepia 119, (2) dorsal neck: Parrot Green 260, (3) scapulars: Parrot Green 260, (4) bend of wing: Parrot Green 260, (5) lesser wing-coverts: Parrot Green 260, (6) median wing-coverts: Parrot Green 260, (7) lesser underwing-coverts: Yellow-Green 58, (8) greater underwing-coverts: Yellow-Green 58, (9) carpal edge: Parrot Green 260 and Cerulean Blue 67, (10) greater secondary-coverts: Parrot Green 260, (11) rump: Lime Green 159, (12) folded secondaries: Parrot Green 260, (13) primaries: Paris Green 63, Cerulean Blue 67 and Jet Black 89 edges, (14) secondaries: Paris Green 63, Cerulean Blue 67 and Jet Black 89 edges, (15) underwing-coverts: Grayish Olive 43, (16) uppertail: Parrot Green 260 and Paris Green 63, (17) undertail: Grayish Olive 43. Furthermore, 16 out of 40 osteological characters analyzed (Appendix 4) support the splitting of *Eupsittula* from *Aratinga* sensu Peters (1937). Particularly, all examined representatives of *Eupsittula* present: (1) *proc. lacrimalis* with rounded shape, (2) absence of indent on median portion of the *proc. orbitalis* of the lacrimal, (3) absence of a deep *fossa temporalis*, (4) *proc. zygomaticus* with rounded shape, (5) *crista nuchalis transversa* with the shape of a reverse U, (6) absence of a ridge on the *ala parasphenoidalis*, (7) crista of the

median portion of the palatine touching the pterygoid, (8) thin *spina externa rostri*, (9) pointed *apex carinae*, (10) pointed *proc. craniolateralis*, (11) *margo caudalis* with triangular shape, (12) not prominent *tuberculum preacetabularis*, (13) closed *sutura iliosyncralis*, (14) prominent *tuberculum supracondylare ventrale*, (15) incompletely ossified *pons supratendineus*, (16) *spina fibulae* not ending at *crista fibularis* level.

From our analysis a total of 15 taxa could be unambiguously diagnosed (Figure 1, 2, 3, 4) and were considered species according to the Phylogenetic Species Concept. These species were placed in the genus *Eupsittula* Bonaparte, 1853, following Remsen *et al.* (2013), since it is the oldest genus name available and their representants present a robust bill, a naked periophthalmic ring and occur in South America (Bonaparte 1853). Moreover, Bonaparte designated *Psittacus petzii* Leiblein, 1832 as the type species for the genus, name that refers to *E. canicularis* (Linnaeus, 1758).

Unfortunately, some type specimens could not be examined, since the contacted curators could not locate them in the collection, often due to lack of an identification number in the original description (as in the case of *Aratinga pertinax lehmanni* Dugand, 1943), or did not reply (as in the case of *Conurus xanthogenius* Bonaparte, 1850). Despite the type specimens of *Psittacus canicularis* Linnaeus, 1758; *Psittacus (Aratinga) eburnirostrum* Lesson, 1842; *Psittacara nana* Vigors, 1830; *Psittacus pertinax* Linnaeus, 1758; *Psittacus aeruginosus* Linnaeus, 1758; *Aratinga pertinax lehmanni* Dugand, 1943; *Conurus chrysophrys* Swainson, 1838; *Conurus xanthogenius* Bonaparte, 1850 and *Psittacus aureus* Gmelin, 1788 could not be analyzed, since there are no doubts about their identity there is no need to designate a neotype (Article 75.2. of the International Code of Zoological Nomenclature 1999, hereafter the *Code*).

3.2 The *Eupsittula canicularis* complex

Eupsittula canicularis was first described by Linnaeus (1758), who based his description on Edwards (1751) and stated that *P. canicularis* was characterized by orange forehead and blue crown. Edwards suggested “West Indies” as the type locality, whereas Linnaeus reported “America”. In 1842, Lesson described *Psittacus (Aratinga) eburnirostrum* as a separate species from Acapulco, Mexico; characterized by ivory bill, orange forehead and blue crown.

Subsequently, Bangs & Peters (1928) considered *eburnirostrum* as a race of *A. canicularis* and designated “northwestern Costa Rica” as the type locality for the nominotypic form. Furthermore, Moore (1937) described a new subspecies, *A. c. clarae*, from northeastern Sinaloa, Mexico;

diagnosed by a reduced orange band on forehead, dark spots on mandible, greener plumage, larger wing and tail than *A. c. eburnirostrum*. This treatment has been followed by all subsequent authors (Arndt 1981; Forshaw 1989; Collar 1997; Juniper & Parr 1998; Forshaw 2010) who recognized three races, based on the extension of orange on forehead and presence of dark spots on mandible. Particularly, *A. c. clarae* occurs in the Mexican states of Sinaloa, Nayarit, Jalisco, Colima, Durango and presents a reduced orange frontal band and dark spots on mandible. *A. c. eburnirostrum* ranges from easternmost Michoacan, to Guerrero and Oaxaca, Mexico; and it is diagnosed by narrower orange frontal band and yellower belly than nominotypic, and grayish sides of mandible. *A. c. canicularis* ranges from Chiapas, Mexico; to southern Guatemala, El Salvador, Honduras, Nicaragua; and northwestern Costa Rica. It is characterized by a broad orange frontal band, blue crown and whitish bill.

Our analysis of plumage and morphometrics (Appendix 5) does not support the existence of three races within *E. canicularis*. In fact, the extension of orange on forehead and the presence of dark spots on mandible randomly vary within the complex (Appendix 6). Therefore, we suggest that *Psittacus (Aratinga) eburnirostrum* Lesson, 1842 and *Aratinga canicularis clarae* Moore, 1937 be considered junior synonyms of *Psittacus canicularis* Linnaeus, 1758. Moreover, according to the Art.76A.2. of the *Code*, we suggest that "Acapulco, Mexico" (Lesson 1842) be considered the type locality of *E. canicularis*, since it is the first locality reported in the literature that corresponds to its range.

***E. canicularis* (Linnaeus, 1758)**

The red and blue-headed Parrakeet Edwards, 1751. A Natural History of Uncommon Birds, II, pl. 176, p. 176. Type locality: West Indies.

Psittacus canicularis Linnaeus, 1758. Systema Naturae, X, p. 98. Type specimen: missing. Type locality: America.

Psittacus petzii Leiblein, 1832. Bayerische Akademie der Wissenschaften, p. 650.

Sittace petzii Wagler, 1832. Monographia Psittacorum, p. 650.

Psittacus (Aratinga) eburnirostrum Lesson, 1842. Revue et Magasin de Zoologie, p. 135. Type specimen: missing. Type locality: Acapulco.

Conurus petzii Gray, 1845. Genera of Birds, II, n° 13, p. 413.

- Conurus eburnirostrum* Gray, 1845. Genera of Birds, II, n° 36, p. 414.
- Aratinga eburnirostrum* Lesson, 1847. Description de Mammiferes et d'Oiseaux recemment decouverts, p. 189.
- Conurus canicularis* Gray, 1849. Genera of Birds, II, p. 413.
- Eupsittula petzi* Bonaparte, 1853. Comptes Rendus, XXXVII, p. 807.
- Eupsittula canicularis* Bonaparte, 1854. Revue et Magasin de Zoologie, n°44, p. 150.
- Conurus pelzii* Souancé, 1857. Iconographie des perroquets, non figurés dans les publications de Levillant et de M. Bourjot Saint-Hilaire, pl. 9.
- Conurus canicularis* - Gray, 1859. List of the Specimens of Birds in the British Museum, III, n°22, p. 37.
- Conurus petzii* - Gray, 1859. List of the Specimens of Birds in the British Museum, III, n°23, p. 37.
- Eupsittaca petzi* Cabanis, 1862. Journal fur Ornithologie, p. 335.
- Conurus canicularis* - Salvadori, 1891. Catalogue of the Birds in the British Museum, XX, p. 201.
- Eupsittula canicularis* - Ridgway, 1916. Bulletin of the United States National Museum, VII, p. 168.
- Aratinga canicularis clarae* Moore, 1937. Proceedings of the Biological Society of Washington, L, p. 101. Holotype: MLZ4343, adult female, El Molino, Sinaloa, Mexico, 3.xi.1933, C.C. Lamb.
- Aratinga canicularis eburnirostrum* Peters, 1937. Checklist of Birds of the World, III, p. 189.
- Aratinga canicularis canicularis* Peters, 1937. Checklist of Birds of the World, III, p. 189.
- Aratinga canicularis canicularis* - Arndt, 1981. Sudamerikanische Sittiche Keilschwanzsittiche i.e. S., Horst Muller-Verlag Walsrode, p. 116.
- Aratinga canicularis eburnirostrum* - Arndt, 1981. Sudamerikanische Sittiche Keilschwanzsittiche i.e. S., Horst Muller-Verlag Walsrode, p. 117.
- Aratinga canicularis clarae* - Arndt, 1981. Sudamerikanische Sittiche Keilschwanzsittiche i.e. S., Horst Muller-Verlag Walsrode, p. 118.

Diagnosis: characterized by whitish (Smoke Gray 45) bill, that can exhibit some dark spots on mandible. Yellow (Orange Yellow 18) periophthalmic ring, orange (Burnt Orange 116) forehead, light orange (Spectrum Orange 17) and blue (Cerulean Blue 67) crown. Cheeks, auriculars, upper

throat, throat and breast are grayish-olive (Grayish Olive 43), with a blue tinge (Cerulean Blue 67) on auriculars. Belly and crural feathers are yellowish green (Yellow-Green 58).

Distribution: occurs in Mexico (Sinaloa, Nayarit, Jalisco, Colima, Durango, easternmost Michoacan, Guerrero, Oaxaca and Chiapas), southern part of Guatemala, El Salvador, Honduras, Nicaragua; and northwestern Costa Rica.

3.3 The *Eupsittula nana* complex

Eupsittula nana has been considered polytypic by the majority of authors, who mainly recognized three slightly differentiated races. However, some have considered them races of *astec* (Bangs & Penard 1919; Peters 1937; Arndt 1981), whereas others of *nana* (Forshaw 1989; Collar 1997; Juniper & Parr 1998; Forshaw 2010). First, Bangs & Penard (1919) described *Eupsittula astec vicinalis* as a subspecies from Tamaulipas, Mexico; that it is generally paler than nominotypic. Second, Griscom (1928) described a new race, *Eupsittula astec extima*, from western Panama, never mentioned by following authors, that he considered darker than *E. a. vicinalis*. Third, Twomey (1950) described *Aratinga astec melloni* as a new subspecies from Honduras that presents more olive-green crown; and paler neck, breast and belly than nominotypic.

Nevertheless, subsequent authors (Forshaw 1989; Collar 1997; Juniper & Parr 1998; Forshaw 2010) recognized only three races within *Aratinga nana*: *A. n. nana*, *A. n. astec* and *A. n. vicinalis*. *A. n. nana* is endemic of Jamaica and exhibits dark olive-brown from throat to belly. *A. n. astec* occurs in Mexico (Veracruz, Tabasco, Campeche, Yucatan, Quintana Roo, Oaxaca), Belize, Guatemala, Honduras, Nicaragua, Costa Rica and westernmost Panama; and presents paler olive-brown from throat to belly, smaller size but proportionally longer wing than *A. n. nana*. *A. n. vicinalis* ranges from central Tamaulipas to San Luis Potosi and northeastern Veracruz, Mexico; it is brighter green, more olive on underparts and less brownish than *A. n. astec*.

From our analysis resulted that there are not significant differences in plumage among *E. a. vicinalis*, *E. a. extima*, *A. a. melloni* and *Conurus astec*. They all exhibit orange feathers on nares, mainly green upperparts, brown-olive underparts and a yellowish brown-olive belly. On the other hand, as already pointed out by Souancé (1857), *Psittacara nana* Vigors, 1830 is larger than other races (Table 1), does not present orange feathers on nares, but presents darker plumage on underparts and a citrine belly (Appendix 7). Therefore, we elevate *astec* and *nana* at species level and we consider *Eupsittula astec vicinalis* Bangs & Penard, 1919; *Eupsittula astec extima* Griscom, 1928 and *Aratinga astec melloni* Twomey, 1950 as junior synonyms of *Conurus astec* Souancé,

1857. Furthermore, we consider “Merida, Yucatan, Mexico” the type locality for *E. astec*, according to Parkes (1976).

***E. astec* (Souancé, 1857)**

Conurus astec Souancé, 1857. Revue et Magasin de Zoologie, p. 97. Type: BMNH1859.11.22.58, Mexico, Massena. Type locality designated by Parkes (1976): Merida, Yucatan, Mexico.

Conurus aztec Souancé, 1857. Iconographie des perroquets, non figurés dans les publications de Levaillant et de M. Bourjot Saint-Hilaire, pl. 12, fig. 2.

Conurus asteco Bonaparte, 1857. Comptes Rendus, p. 538.

Conurus frontalis Finsch, 1867. Papageien, I. p. 522.

Conurus aztec - Salvadori, 1891. Catalogue of the Birds in the British Museum, XX, p. 192.

Eupsittula astec Ridgway, 1916. Bulletin of the United States National Museum, No. 50, VII, p. 171.

Eupsittula astec vicinalis Bangs & Penard, 1919. Bulletin of the Museum of Comparative Zoology at Harvard College, 63, p. 24. Type: MCZ48482, adult male, Altamira, Tamaulipas, Mexico, 24.xii.1908, E.B. Armstrong.

Eupsittula astec extima Griscom, 1928. American Museum Novitates, no. 293, p. 2. Type: AMNH233593, adult male, Almirante, Boca del Toro, western Panama, 24.viii.1927, Rex R. Benson.

Aratinga astec vicinalis Peters, 1937. Checklist of Birds of the World, III, p. 189.

Aratinga astec astec Peters, 1937. Checklist of Birds of the World, III, p. 189.

Aratinga astec melloni Twomey, 1950. A new race of paroquet of the species *Aratinga astec* from the Republic of Honduras. Annals of Carnegie Museum, vol. 31, p. 297. Holotype: CMP133003, adult male, 30.iv.1948, La Ceiba, Atlantida, Honduras, Twomey and Hawkins.

Aratinga nana astec Forshaw, 1989. Parrots of the World, Blandford, p. 444.

Aratinga nana vicinalis Forshaw, 1989. Parrots of the World, Blandford, p. 444.

Aratinga astec astec - Arndt, 1981. Sudamerikanische Sittiche Keilschwanzsittiche i.e. S., Horst Muller-Verlag Walsrode, p. 120.

Aratinga astec vicinalis - Arndt, 1981. Sudamerikanische Sittiche Keilschwanzsittiche i.e. S., Horst Muller-Verlag Walsrode, p. 120.

Aratinga astec melloni - Arndt, 1981. Sudamerikanische Sittiche Keilschwanzsittiche i.e. S., Horst Muller-Verlag Walsrode, p. 121.

Aratinga nana astec - Collar, 1997 in Eds del Hoyo, J.; Elliott, A. and Sargatal, J. Handbook of the Birds of the World. Vol. 4: Sandgrouse to Cuckoos. Lynx Edicions: Barcelona, p. 432.

Aratinga nana vicinalis - Collar, 1997 in Eds del Hoyo, J.; Elliott, A. and Sargatal, J. Handbook of the Birds of the World. Vol. 4: Sandgrouse to Cuckoos. Lynx Edicions, Barcelona, p. 432.

Diagnosis: diagnosed by orange (Spectrum Orange 17) feathers on nares; brown-olive (Brownish Olive 29) upper throat, throat and breast. Belly is yellowish brown-olive (Citrine 51).

Distribution: occurs in eastern Mexico (Tamaulipas, San Luis Potosi, Veracruz, Tabasco, Campeche, Yucatan, Quintana Roo, Oaxaca), Belize, Guatemala, Honduras, Nicaragua, Costa Rica and northeastern Panama.

***E. nana* (Vigors, 1830)**

Psittacara nana Vigors, 1830. The Zoological Journal (1832-1834), V, p. 273. Type specimen: lost, probably from the Zoological Garden of London. Type locality: Jamaica.

Conurus nanus Gray, 1845. Genera of Birds, II, n° 32, p. 414.

Conurus flaviventer Gosse, 1847. The Birds of Jamaica, p. 263.

Conurus nanus - Cory, 1886. The Birds of the West Indies, including the Bahama Islands, the Greater and the Lesser Antilles, excepting the Islands of Tobago and Trinidad. *The Auk*, III, p. 456.

Eupsittula nana Ridgway, 1916. Bulletin of the United States National Museum, VII, No. 50, p. 174.

Aratinga nana Peters, 1937. Checklist of Birds of the World, III, p. 189.

Aratinga astec nana Arndt, 1981. Sudamerikanische Sittiche Keilschwanzsittiche i.e. S., Horst Muller-Verlag Walsrode, p. 121.

Aratinga nana nana Forshaw, 1989. Parrots of the World, Blandford, p. 444.

Diagnosis: characterized by dark brown-olive (dark Brownish Olive 29) upper throat, throat and breast. The belly is dark citrine (dark Citrine 51).

Distribution: endemic of Jamaica.

3.4 The *Eupsittula pertinax* complex

The majority of authors currently recognized 14 subspecies within the *E. pertinax* complex (*pertinax*, *xanthogenia*, *tortugensis*, *arubensis*, *aeruginosa*, *lehmanni*, *griseipecta*, *margaritensis*,

venezuelae, *chrysophrys*, *chrysogenys*, *surinama*, *paraensis* and *ocularis*), occurring in the northern part of South America, mainly based on the variation of cheeks and auriculars coloration (Arndt 1981; Forshaw 1989; Collar 1997; Juniper & Parr 1998; Forshaw 2010). Nevertheless, no author has ever revised all subspecies reported in the literature and descriptions have always been based on comparisons with another or few other races. Moreover, as new races were described, their ranges of distribution were confused and often overlapping.

Cory (1909) initially considered *arubensis* and *tortugensis* as subspecies of *Conurus aeruginosus*. He described the new race *C. a. tortugensis* from Tortuga Island as similar to nominotypic, but presenting more orange yellow on sides of head, paler throat, more yellowish green underwing-coverts, longer wing and tail. On the other hand, Ridgway (1916) recognized five subspecies within *E. pertinax* (*E. p. pertinax* from Curaçao and Saint Thomas Islands, *E. p. xanthogenia* from Bonaire Island, *E. p. tortugensis* from Tortuga Island, *E. p. arubensis* from Aruba Island and *E. p. aeruginosus* from mainland Venezuela, Guyana, Suriname and French Guiana) and created a key based on head plumage. According to him, *E. p. pertinax* is characterized by green crown, occiput and nape. *E. p. xanthogenia* presents yellow part of crown, occiput and nape. *E. p. tortugensis* exhibits an extensive yellow suborbital area, whereas *E. p. arubensis* presents a restricted yellow suborbital area and light brownish rictal region, cheeks and lores. *E. p. aeruginosus* is diagnosed by an orbital region not distinctly yellow. Later, Cory (1918), in addition to the races recognized by Ridgway, included *E. p. chrysophrys* and described a new one, *E. p. margaritensis*. Moreover, he considered eastern Venezuela, Guyana, Suriname and French Guiana as the range of *E. p. chrysophrys*, whereas he stated that *E. p. aeruginosus* occurs in Colombia, northwestern Venezuela and Rio Branco region in Brazil. The new race *E. p. margaritensis* is similar to *E. p. chrysophrys* from Guyana in presenting pronounced yellow markings on face, but it exhibits paler cheeks and throat, and more extended whitish on forehead. Finally, Peters (1937), without providing any rationale, placed all the aforementioned races in the genus *Aratinga*, including *A. p. ocularis* within the subspecies of *pertinax*, whereas Ridgway (1916) and Cory (1918) considered it a separate species.

Particularly in the second half of the 20th century several new races have been described. Dugand (1943) described *A. p. lehmanni* from the Colombian department of Meta, as similar to *A. p. chrysophrys* from Guyana, but presenting greener remiges, reduced orange on belly, darker throat, and more contrasting auriculars where light feathers have dark edges, almost as in *A. p. aeruginosa* from the caribbean coast. Moreover, a few years later Meyer de Schauensee (1950)

described another subspecies from the Colombian department of Bolivar, *A. p. griseipecta*, that differs from *A. p. aeruginosa* in presenting olive-gray cheeks, throat and upper breast, instead of brown; green crown, instead of blue; and lacks shaft streaks on cheeks. In 1951, Zimmer & Phelps described two other races of *pertinax*, *A. p. venezuelae* from the Venezuelan state of Bolivar and *A. p. surinama* from Guyana, Suriname, coast of British Guiana and delta of the Orinoco River in Venezuela. Also, they included *A. p. chrysogenys* (Massena & Souancé, 1854) within the subspecies of *pertinax* and proposed “Yavanarí, middle-upper Rio Negro, Brazil” as the type locality. Zimmer & Phelps stated that *A. p. venezuelae* differs from *A. p. margaritensis*, from Margarita Island, in being smaller in size, paler green, more yellowish on upperparts and presenting inner webs of rectrices edged with yellow. Furthermore, it differs from *A. p. chrysophrys*, that according to them occurs in Guyana, Suriname and interior of British Guiana, by having less orange on belly. On the other hand, *A. p. surinama* exhibits orange on forehead, forward to bill and over the cheeks, whereas individuals of *A. p. chrysophrys* from the interior of British Guiana present a well-defined orange ring around the eye. Finally, *A. p. chrysogenys* differs from *A. p. chrysophrys* in having dark bluish top of the head; no pale frontal band; dark green back; dark brown sides of head, auriculars, throat and breast; darker orange and more extended tinge on belly. The last race of *A. pertinax* to be described was *paraensis*, first placed in the *A. pertinax* complex by Pinto (1978), that Sick (1959) considered a subspecies of *A. cactorum* from the Rio Cururu region in Pará, Brazil. Sick stated that *A. c. paraensis* differs from *A. cactorum* in presenting more beige-brown throat and breast; bluish green forehead and crown instead of bluish gray; and an orange spot behind the eye.

Our analysis of plumage and morphometrics revealed the existence of 10 valid taxa within the *E. pertinax* complex that were elevated at species level. In particular, *E. pertinax* presents yellow on forehead, cheeks, auriculars and upper throat; while crown is yellow and blue, sometimes mixed with some green. It occurs on Curaçao, Saint Thomas and Virgin Islands. The first to use a valid name for *E. pertinax* was Linnaeus (1758), who based his description on Edwards’ (1758) plate and description of the “Yellow-faced Parrakeet”. Linnaeus reported “Indies” as the type locality, whereas Edwards stated that the bird he drew was from the “West Indies”, name that corresponds to the actual United States Virgin Islands and is the correct type locality. Cory (1918) was the first author to consider *pertinax* as a subspecies of *A. pertinax*, treatment followed by subsequent authors (Peters 1937; Arndt 1981; Forshaw 1989; Collar 1997; Juniper & Parr 1998; Forshaw 2010; Clements *et al.* 2014).

E. ocularis is characterized by a yellow band in front of and below the eye, as already pointed out by Sclater & Salvin (1864); dull blue forehead and crown; and brownish olive cheeks, auriculars, upper throat, throat and breast. Its type locality is the Isthmus of Panama, but it also occurs in southwestern Costa Rica and throughout Panama (Clements *et al.* 2014; BirdLife International 2015). Peters (1937) was the first to consider *ocularis* a subspecies of *A. pertinax*, while previous authors considered it a separate species (Sclater & Salvin 1864; Gray 1870; Salvadori 1891; Ridgway 1916; Cory 1918).

E. arubensis is diagnosed by yellow forehead, area around the eye and upper part of cheeks and auriculars. Lower part of cheeks and auriculars are buff color mixed with fawn color; while upper throat and throat are a mix of yellow and grayish olive. It is endemic of Aruba Island, Netherlands Antilles. Initially considered a subspecies of *Conurus aeruginosus* by Cory (1909), was placed in the genus *Aratinga*, as a race of *pertinax*, by Peters (1937) and this classification has been followed by all subsequent authors (Arndt 1981; Forshaw 1989; Collar 1997; Juniper & Parr 1998; Forshaw 2010; Clements *et al.* 2014).

E. xanthogenia presents totally yellow head, upper and lower throat; crown sometimes with some blue and green feathers. It is endemic of Bonaire Island, Netherlands Antilles. First considered a race of *Conurus pertinax* by Hartert (1902), was placed in the genus *Aratinga* by Peters (1937) and treated as a subspecies of *A. pertinax* by all following authors (Arndt 1981; Forshaw 1989; Collar 1997; Juniper & Parr 1998; Forshaw 2010; Clements *et al.* 2014).

E. tortugensis is characterized by dull yellow forehead; yellow area around the eye, upper part of cheeks and auriculars. Lower part of cheeks and auriculars are yellow mixed with fawn color; while upper throat and throat are yellow mixed with grayish olive. It is endemic of Tortuga Island, Venezuela. First described by Cory (1909) as a subspecies of *Conurus aeruginosus*, was considered a race of *A. pertinax* by Peters (1937) and subsequent authors (Arndt 1981; Forshaw 1989; Collar 1997; Juniper & Parr 1998; Forshaw 2010; Clements *et al.* 2014).

E. aeruginosa was first described as *Psittacus aeruginosus* by Linnaeus (1758), who based his description on Edwards' (1751) description and plate (Figure 5). According to Linnaeus the bird was from "America", while Edwards reported that it came from the "West Indies", the actual United States Virgin Islands. Subsequently, several type localities have been proposed for the forms considered to be *aeruginosus*. Salvadori (1891) stated that the range of *Conurus aeruginosus* included Venezuela, Guyana and Rio Negro region in Brazil. Berlepsch & Hartert (1902) suggested "Cumana, Venezuela" as the type locality for *C. aeruginosus*. Todd (1915)

described *Aratinga aeruginosa occidentalis*, a race from Colombia characterized by dusky brownish forehead, pronounced blue crown and scarce or any yellow tinge around the eye. Ridgway (1916) considered *aeruginosus* a subspecies of *E. pertinax* occurring in inland Venezuela, Guyana, Suriname and British Guiana. Chapman (1917) did not mention the race described by Todd, but stated that *A. aeruginosus* included *A. a. aeruginosus* from Calamar, Colombia and *A. a. chrysophrys* from Venezuela, Guyana, Suriname and British Guiana. The race *A. a. aeruginosus* would correspond to the bird represented in Edwards' plate, that sometimes presents few yellow feathers below the eye; whereas *A. a. chrysophrys* applies to birds with a yellow ring around the eye, whiter forehead, paler sides of head and breast; and less streaked auriculars. Cory (1918) followed Ridgway (1916), but reported "Calamar, lower Magdalena River, Colombia" (Chapman 1917) as the type locality for *E. p. aeruginosus*; and Colombia, northwestern Venezuela and Rio Branco region in Brazil as its range. Our analysis reported that birds occurring in northern Colombia and northwestern Venezuela are similar and belong to *E. aeruginosa*, as suggested by Clements *et al.* (2014). Furthermore, we could not find any significant differences in plumage among *Psittacus aeruginosus* Linnaeus, 1758; *Aratinga aeruginosa occidentalis* Todd, 1915; *Aratinga pertinax lehmanni* Dugand, 1943 and *Aratinga pertinax griseipecta* Meyer de Schauensee, 1950 (Appendix 8). They all present buff color forehead; blue crown; buff color feathers with fawn color edges on area around the eye, cheeks, auriculars, upper throat and throat. They sometimes exhibit a ring of yellow feathers around the eye and the intensity of crown, cheeks and auriculars coloration randomly vary among the analyzed specimens. Therefore, we suggest that *Aratinga aeruginosa occidentalis* Todd, 1915; *Aratinga pertinax lehmanni* Dugand, 1943 and *Aratinga pertinax griseipecta* Meyer de Schauensee, 1950 be considered as junior synonyms of *Psittacus aeruginosus* Linnaeus, 1758 with "Rio Hacha, Colombia" (Todd 1915) as the type locality, since it is the first locality reported in the literature that corresponds to the range of *E. aeruginosa*, the only species occurring in Colombia.



Figure 5. Edwards' plate of the Yellow-faced Parrakeet (1758), corresponding to *Psittacus aeruginosus* Linnaeus, 1758.

E. margaritensis was first described by Cory (1918), who considered it a subspecies of *E. pertinax* endemic of Margarita Island, Venezuela. In 1951, Zimmer & Phelps described *A. p. venezuelae* from the Orinoco River, Venezuela as a smaller race, paler green, more yellowish on upperparts than *A. p. margaritensis*; and with inner webs of rectrices edged with yellow. Subsequent authors have considered these races as subspecies of *A. pertinax* (Peters 1937; Arndt 1981; Forshaw 1989; Collar 1997; Juniper & Parr 1998; Forshaw 2010; Clements *et al.* 2014). Nevertheless, our analysis did not support these differences. Particularly, both individuals from Margarita Island and inland Venezuela present buff color forehead, yellow area around the eye and blue crown. Cheeks, auriculars, upper throat and throat are grayish with some buff color (Appendix 9). Therefore, we consider *Aratinga pertinax venezuelae* Zimmer & Phelps, 1951 a junior synonym of *Eupsittula pertinax margaritensis* Cory, 1918.

E. chrysophrys was first described by Swainson (1838) as a species from the interior of Guyana, characterized by a yellow ring of feathers around the eye. As in the case of *E. aeruginosa*, several localities have been proposed that often refer to other races of *A. pertinax*. For instance, Chapman (1917) considered *chrysophrys* a subspecies of *A. aeruginosus* from Venezuela, Guyana, Suriname and British Guiana. Cory (1918) placed it in the genus *Eupsittula* as a subspecies of *pertinax* and agreed with Chapman regarding the distribution. Peters (1937) considered it a subspecies of *A. pertinax* and restricted its range to Guyana, Suriname and British Guiana. Pinto (1978) stated that *A. p. chrysophrys* occurs in southeastern Venezuela, British Guiana and upper Rio Branco, in Brazil. Subsequent authors followed Pinto and reported interior of Guyana, Cerro Roraima, southeastern Bolivar in Venezuela and extreme northern Roraima in Brazil (Forshaw

1989; Collar 1997; Juniper & Parr 1998; Forshaw 2010). Zimmer & Phelps (1951) were the first authors to suggest that *Conurus chrysogenys* Massena & Souancé, 1854 should be considered a race of *A. pertinax*, based on an illustration of Souancé (1857) that represents a bird from the Rio Negro, that despite being under the name of *C. chrysophrys*, resembles *A. p. chrysogenys*. According to these authors, *A. p. chrysogenys* differs from *A. p. chrysophrys* in presenting dark bluish crown, dark green back, dark brown sides of the head, auriculars, throat, breast; and lacking pale frontal band. In addition, they suggested “Yavanarí, middle-upper Rio Negro, Brazil” as the type locality for *A. p. chrysogenys* and “Annai region, Rupununi River, southern British Guiana” for *A. p. chrysophrys*. Based on our analysis, both taxa exhibit dull yellow forehead, yellow area around the eye, blue crown and fawn color with little buff color cheeks and auriculars. Upper and lower throat are brownish olive (Appendix 10). Since we did not find any constant and geographically cohesive differences between the two races, we consider *Conurus chrysogenys* Massena & Souancé, 1854 as a junior synonym of *Conurus chrysophrys* Swainson, 1838. Moreover, we restrict the range of *E. chrysophrys* to southeasteast Venezuela, interior of Guyana; Roraima state, Rio Negro and Solimões regions in Brazil.

E. surinama was described by Zimmer & Phelps (1951) as a race of *A. pertinax* that occurs in Guyana, Suriname and along the coast of British Guiana to the delta of the Orinoco River in Venezuela. According to them, it is diagnosed by orange on forehead, forward to bill and over the cheeks; while individuals of *A. p. chrysophrys* from the interior of British Guiana present a well-defined orange ring around the eye. Our analysis supported the existence of a species, *E. surinama*, occurring in this range that is characterized by yellow mixed with orange area around the eye, cheeks and upper part of auriculars. Lower part of auriculars is yellow and fawn color; while upper throat and throat are yellow mixed with grayish olive. It differs from individuals of *E. chrysophrys* that occur in the interior of British Guiana, who exhibit yellow restricted to the area around the eye. *E. surinama* and *E. chrysophrys* can occur sympatrically on the coast of British Guiana (Zimmer & Phelps 1951).

Despite *E. paraensis* being described by Sick (1959) as a subspecies of *A. cactorum*, and treated as a race of *A. pertinax* by subsequent authors (Peters 1937; Arndt 1981; Forshaw 1989; Collar 1997; Juniper & Parr 1998; Forshaw 2010; Clements *et al.* 2014); we consider it a separate species characterized by a yellow band below and behind the eye; dull blue forehead and crown; dark brownish olive cheeks, auriculars, upper throat and throat. It occurs only in the Rio Cururu region, Brazil.

***E. pertinax* (Linnaeus, 1758)**

Yellow-faced Parrakeet Edwards, 1758. Gleanings of Natural History, p. 49, pl. 234.

Psittacus pertinax Linnaeus, 1758. Systema Naturae, X, p. 98. Type specimen: missing. Type locality: Indies.

Psittaca illiniaca Brisson, 1760. Ornithologie, IV, p. 353.

Psittacus pertinax - Linnaeus, 1766. Systema Naturae, I, n° 15, p. 142.

Psittacus tui Ledru, 1810. Voyage aux îles de Ténériffe, la Trinité, Saint-Thomas, Sainte-Croix et Porto Ricco, p. 39.

Aratinga pertinax Spix, 1824. Avium Species Novae, I, p. 37.

Sittace pertinax Wagler, 1832. Monographia Psittacorum, p. 652.

Aratinga pertinax - Brehm, 1842. Monographie der Papageien, pl. 29.

Conurus pertinax Gray, 1845. Genera of Birds, II, n° 11, p. 413.

Conurus xantholaemus Sclater, 1859. Annals & Magazine of Natural History, III, part 4, p. 225. Type: BMNH1859.10.11.1, Saint Thomas, Newton.

Conurus newtonorum Gray, 1870. Hand-list of Genera and Species of Birds, II, n°8115, p. 148.

Conurus xantholaemus - Cory, 1886. The Birds of the West Indies, including the Bahama Islands, the Greater and the Lesser Antilles, excepting the Islands of Tobago and Trinidad. *The Auk*, III, p. 456.

Conurus pertinax - Salvadori, 1891. Catalogue of the Birds in the British Museum, XX, p. 197.

Eupsittula pertinax pertinax Ridgway, 1916. Bulletin of the United States National Museum, VII, No. 50, p. 164.

Aratinga pertinax pertinax Cory, 1918. Catalogue of the Birds of the Americas, II, p. 62.

Diagnosis: diagnosed by yellow (Orange Yellow 18) forehead; yellow (Orange Yellow 18) mixed with orange (Spectrum Orange 17) area around the eye, cheeks, auriculars and upper throat. The crown is yellow (Orange Yellow 18) and blue (Cerulean Blue 67), and sometimes presents some green (Parrot Green 260). Throat and breast are grayish-olive (Grayish Olive 43).

Distribution: occurs on Curaçao Island, introduced on Saint Thomas and Virgin Islands.

***E. ocularis* (Sclater & Salvin, 1864)**

Conurus ocularis Sclater & Salvin, 1864. Proceedings of the Zoological Society of London, p. 367.

Type: BMNH1889.1.30.116, male, Isthmus of Panama, Salvin-Godman collection.

Conurus ocularius Gray, 1870. Hand-list of Genera and Species of Birds, II, n°8120, p. 148.

Conurus ocularis - Salvadori, 1891. Catalogue of the Birds in the British Museum, XX, p. 197.

Eupsittula ocularis Ridgway, 1916. Bulletin of the United States National Museum, VII, No. 50, p. 167.

Eupsittula occularis Cory, 1918. Catalogue of the Birds of the Americas, II, p. 63.

Aratinga pertinax ocularis Peters, 1937. Checklist of Birds of the World, III, p. 189.

Diagnosis: characterized by a yellow (Orange Yellow 18) band in front and below the eye, dull blue (Cerulean Blue 67) forehead and crown. Cheeks, auriculars, upper throat, throat and breast are brownish-olive (Brownish Olive 29).

Distribution: occurs in southwestern Costa Rica and Panama.

***E. arubensis* (Hartert, 1892)**

Conurus arubensis Hartert, 1892. Bulletin of British Ornithologists' Club, p. 16. Type:

AMNH474446, male, Aruba Island, 2.vii.1892, Hartert.

Conurus aeruginosus arubensis Cory, 1909. Field Museum of Natural History, Publication n°137.

The Birds of the Leeward Islands, Caribbean Sea, p. 199.

Eupsittula pertinax arubensis Ridgway, 1916. Bulletin of the United States National Museum, VII, p. 167.

Aratinga pertinax arubensis Peters, 1937. Checklist of Birds of the World, III, p. 190.

Diagnosis: diagnosed by yellow (Orange Yellow 18) area around the eye and forehead. Crown is blue (Cerulean Blue 67). Cheeks and auriculars are yellow (Orange Yellow 18) in the upper part and buff color (Color Buff 124) mixed with fawn color (Fawn Color 25) in the rest. Upper throat and throat are yellow (Orange Yellow 18) mixed with grayish olive (Grayish Olive 43).

Distribution: endemic of Aruba Island.

***E. xanthogenia* (Bonaparte, 1850)**

Conurus xanthogenius Bonaparte, 1850. *Conspectus Generum Avium*, I, p. 1. Holotype:

RMNH87938, adult, Bonaire, Antilles.

Conurus pertinax var. Finsch, 1867. *Die Papageien*, I, p. 508.

Conurus xanthogenius - Hartert, 1892. *Bulletin of the British Ornithologists' Club*, III, p. 12.

Conurus pertinax xanthogenius Hartert, 1902. *Novitates Zoologicae*, IX, n°19, p. 302.

Eupsittula pertinax xanthogenia Ridgway, 1916. *Bulletin of the United States National Museum*, VII, No. 50, p. 166.

Aratinga pertinax xanthogenia Peters, 1937. *Checklist of Birds of the World*, III, p. 191.

Diagnosis: presents yellow forehead (Orange Yellow 18); yellow (Orange Yellow 18) mixed with orange (Spectrum Orange 17) area around the eye, cheeks, auriculars, upper throat and throat. Crown is mainly yellow (Orange Yellow 18), but it can exhibit blue (Cerulean Blue 67) and green (Parrot Green 260) feathers. Nape can be yellow (Orange Yellow 18) or green (Parrot Green 260).

Distribution: endemic of Bonaire Island.

***E. tortugensis* (Cory, 1909)**

Conurus aeruginosus tortugensis Cory, 1909. *Field Museum of Natural History, Publication n° 137, The Birds of the Leeward Islands, Caribbean Sea*, p. 220. Type: FMNH36976, adult male, Tortuga Island, Venezuela, 2.ii.1909, J.F. Ferry.

Eupsittula pertinax tortugensis Ridgway, 1916. *Bulletin of the United States National Museum*, VII, p. 163.

Aratinga pertinax tortugensis Peters, 1937. *Checklist of Birds of the World*, III, p. 190.

Diagnosis: characterized by yellow (Orange Yellow 18) area around the eye and duller yellow (Orange Yellow 18) on forehead. Crown is blue (Cerulean Blue 67). Cheeks and auriculars are yellow (Orange Yellow 18) in the upper part and yellow (Orange Yellow 18) mixed with fawn color (Fawn Color 25) in the lower. Upper throat and throat are yellow (Orange Yellow 18) mixed with grayish olive (Grayish Olive 43).

Distribution: endemic of Tortuga Island, Venezuela.

***E. aeruginosa* (Linnaeus, 1758)**

Brown-throated Parakeet Edwards, 1751. A Natural History of Uncommon Birds, IV, pl. 177.

Psittacus aeruginosus Linnaeus, 1758. Systema Naturae, X, p. 98. Type specimen: missing. Type locality: America.

Psittaca martinicana Brisson, 1760. Ornithologie, IV, n°69, p. 356.

Psittacus aeruginosus - Linnaeus, 1766. Systema Naturae, I, n°17, p. 142.

Psittacus plumbeus Gmelin, 1788. Systema Naturae, I, n°75, p. 326.

Aratinga aeruginosus Stephens, 1826. General Zoology, XIV, p. 139.

Conurus aeruginosus Salvadori, 1891. Catalogue of the Birds in the British Museum, XX, p. 195.

Aratinga aeruginosa occidentalis Todd, 1915. Proceedings of the Biological Society of Washington, XXVIII, p. 81. Type: CM44695, adult male; Rio Hacha, Colombia, 22.ii.1914, M. A. Carriker Jr.

Eupsittula pertinax aeruginosus Ridgway, 1916. Bulletin of the United States National Museum, VII, No. 50, p. 163.

Aratinga aeruginosus aeruginosus Chapman, 1917. Bulletin of the American Museum of Natural History, XXXVI, p. 257.

Eupsittula pertinax aeruginosus - Cory, 1918. Catalogue of the Birds of the Americas, II, p. 62.

Aratinga pertinax aeruginosa Peters, 1937. Checklist of Birds of the World, III, p. 189.

Aratinga pertinax aeruginosus Pinto, 1937. Catalogo das Aves do Brasil, I, p. 131.

Aratinga pertinax lehmanni Dugand, 1943. Caldasia, II, n°7. Dos Nuevas Aves de Colombia, p. 191. Type: male, Instituto de Ciencias Naturales, Caño Quenane, llanos del Meta, est of Villavicencio, 450 m, 10.xii.1940, col. Lehmann.

Aratinga pertinax griseipecta Meyer de Schauensee, 1950. Notulae Naturae, 221, Colombian Zoological Survey, part IV, New Birds from Colombia, p. 6. Type: ANSP160393, adult male, Tierra Alta, Bolivar, Colombia, 5.iii.1949, Sneider.

Aratinga pertinax aeruginosa - Forshaw, 1989. Parrots of the World, Blandford, p. 449.

Aratinga pertinax griseipecta - Forshaw, 1989. Parrots of the World, Blandford, p. 500.

Aratinga pertinax lehmanni - Forshaw, 1989. Parrots of the World, Blandford, p. 500.

Diagnosis: diagnosed by mainly blue (Cerulean Blue 67) and buff color (Color Buff 124) feathers with fawn color edges (Fawn Color 25) area around the eye, sometimes it can exhibit a thin ring of yellow (Orange Yellow 18) feathers. The forehead is buff color (Color Buff 124) and the crown is blue (Cerulean Blue 67). Cheeks, auriculars, upper throat and throat exhibit buff color (Color Buff

124) feathers with fawn color (Fawn Color 25) edges.

Distribution: occurs in northern Colombia and northwestern Venezuela.

***E. margaritensis* (Cory, 1918)**

Eupsittula pertinax margaritensis Cory, 1918. Catalogue of the Birds of the Americas, II, p. 63.

Type: FMNH39151, adult male, Margarita Island, Venezuela, 1.iii.1909, J.H. Ferry.

Aratinga pertinax margaritensis Peters, 1937. Checklist of Birds of the World, III, p. 190.

Aratinga pertinax venezuelae Zimmer & Phelps, 1951. American Museum Novitates, n°1511, New Subspecies of Birds from Surinam and Venezuela, p. 6. Type: AMNH474454, adult male, Altagracia, Orinoco River, Bolivar, Venezuela, 6.xi.1897, Cherrie K. and S.M.

Aratinga pertinax venezuelae - Arndt, 1981. Sudamerikanische Sittiche Keilschwanzsittiche i.e. S., Horst Muller-Verlag Walsrode, p. 107.

Aratinga pertinax margaritensis - Arndt, 1981. Sudamerikanische Sittiche Keilschwanzsittiche i.e. S., Horst Muller-Verlag Walsrode, p. 107.

Diagnosis: characterized by yellow (Orange Yellow 18) area around the eye and buff color (Color Buff 124) forehead. Crown is blue (Cerulean Blue 67). Cheeks, auriculars, upper throat and throat are grayish (Smoke Gray 45) with some buff color (Color Buff 124).

Distribution: Margarita Island, north and central Venezuela.

***E. chrysophrys* (Swainson, 1838)**

Conurus chrysophrys Swainson, 1838. Animals in Menageries, p. 320. Type specimen: missing.

Type locality: interior of Guiana.

Conurus chrysogenys Massena & Souancé, 1854. Revue et Magasin de Zoologie, p. 72. Syntype: ANSP22333, ad. No data. Rivoli Collection. Type locality: Rio Negro and Colombia (Massena & Souancé 1854); Yavanarí, middle-upper Rio Negro, Brazil (Zimmer & Phelps 1951).

Sittace chrysogenys Pelzen, 1871. Zur Ornithologie Brasiliens, p. 258.

Aratinga chrysophrys Cherrie, 1916. Bulletin of the Brooklyn Institute of Arts & Science, II, n° 6. A Contribution to the Ornithology of the Orinoco region, p. 331.

Aratinga aeruginosus chrysophrys Chapman, 1917. Bulletin of the American Museum, XXXVI, p. 258.

Eupsittula pertinax chrysophrys Cory, 1918. Catalogue of the Birds of the Americas, II, p. 63.

Aratinga pertinax chrysophrys Peters, 1937. Checklist of Birds of the World, III, p. 190.

Aratinga pertinax chrysogenys Zimmer & Phelps, 1951. American Museum Novitates, n°1511, New Subspecies of Birds from Surinam and Venezuela, p. 7.

Aratinga pertinax chrysogenys - Pinto, 1978. Novo Catalogo das Aves do Brasil, I, p. 136.

Aratinga pertinax chrysophrys - Pinto, 1978. Novo Catalogo das Aves do Brasil, I, p. 136.

Diagnosis: diagnosed by yellow (Orange Yellow 18) area around the eye and dull yellow (Orange Yellow 18) forehead. Crown is blue (Cerulean Blue 67). Cheeks and auriculars are fawn color (Fawn Color 25) with little buff color (Color Buff 124). Upper throat and throat are brownish olive (Brown Olive 29).

Distribution: ranges from southeast Venezuela to interior of Guyana; Roraima state, Rio Negro and Solimões regions in Brazil.

***E. surinama* (Zimmer & Phelps, 1951)**

Aratinga pertinax surinama Zimmer & Phelps, 1951. American Museum Novitates, n°1511, New Subspecies of Birds from Surinam and Venezuela, p. 1. Type: AMNH474483, adult male, Surinam, 10.ii.1900, B. Chunkoo.

Diagnosis: characterized by yellow (Orange Yellow 18) mixed with orange (Spectrum Orange 17) area around the eye, cheeks and upper part of auriculars. The lower part of auriculars is yellow (Orange Yellow 18) and fawn color (Fawn Color 25). Forehead is dull yellow (Orange Yellow 18) and crown is blue (Cerulean Blue 67). Upper throat and throat are yellow (Orange Yellow 18) mixed with grayish olive (Grayish Olive 43).

Distribution: occurs on the Delta Orinoco River in Venezuela, Trinidad Island (Kenefick *et al.* 2007), Guyana, Suriname and coast of French Guiana.

***E. paraensis* (Sick, 1959)**

Aratinga cactorum paraensis Sick, 1959. Journal fur Ornithologie, p. 413. Holotype: MNRJA28910, male, upper Rio Cururu, Pará, Brazil, 23.vii.1957, Sick.

Aratinga pertinax paraensis Pinto, 1978. Novo Catalogo das Aves do Brasil, I, p. 136.

Diagnosis: diagnosed by a yellow (Orange Yellow 18) band below and behind the eye, dull blue (Cerulean Blue 67) forehead and crown. Cheeks, auriculars, upper throat and throat are a dark brownish olive (Brownish Olive 29).

Distribution: endemic of the Rio Cururu region, an affluent of Rio Tapajos in the state of Pará, Brazil.

3.5 The *Eupsittula aurea* complex

The first author to use a valid name for *E. aurea* was Gmelin (1788), who like other authors before and after him, based his description on Edwards' (1758) plate and description of the "Golden-crowned Parrakeet" from Brazil. For instance, Brisson (1760) already called it *Psittaca brasiliensis* and "*Psittaca brasiliensis fronte rubra*" in the same publication; whereas Buffon (1790) called it "*Perriche couronnee d'Or*". Some authors, because *E. aurea* is similar in plumage to *E. canicularis* and first descriptions were mainly based on few captive individuals often with uncertain provenience, have often confused the two taxa. Levaillant (1801) described *E. aurea* twice in the same publication, under the name of "*La Perruche a front rouge*" and "*La Perruche couronnee d'Or*". Moreover, Lichtenstein (1823), Stephens (1826), Cabanis (1848) and Bonaparte (1854) used the name *canicularis* to refer to *E. aurea*. In 1832, Wagler extended the range of *E. aurea* to Guyana, Brazil and Paraguay; and Salvadori (1891) included Bolivia. Brabourne & Chubb (1912) followed Salvadori and placed *aurea* in the genus *Aratinga*. Cherrie & Reichenberger (1923) considered the individuals from Rio Paraguay to represent a different race with longer wing and tail than nominotypic and called it *E. a. major*. Furthermore, they suggested "Bahia, eastern Brazil" as the type locality for *E. a. aurea*. Subsequent authors recognized two races within *A. aurea*, but they did not agree regarding their distribution (Peters 1937; Pinto 1938, 1978; Arndt 1981; Forshaw 1989; Collar 1997; Juniper & Parr 1998; Forshaw 2010). According to Forshaw (1989), *A. a. aurea* occurs in southernmost Suriname, throughout most of inland Brazil, south of the Amazon River and north of it, to extreme southeastern Peru, eastern Bolivia and extreme north-western Argentina; while *A. a. major* occurs in northern Paraguay, southern Bolivia, south western Mato Grosso in Brazil and northwestern Argentina. On the other hand, Juniper & Parr (1998) reported north of Amazon to Bolivia and Peru, south through Paraguay to extreme north west Argentina for *A. a. aurea*; and Paraguay, Bolivia and north Argentina for *A. a. major*. Our analysis of plumage and

morphometrics did not report any differences in plumage (Appendix 11) and size (Appendix 5) between the two races. Particularly, both taxa exhibit black bill (whereas *E. canicularis* has whitish bill), yellow area around the eye; orange forehead; light orange and blue crown; green nape; grayish olive cheeks and grayish olive with blue tinge on auriculars. Therefore, we consider *Eupsittula aurea major* Cherrie & Reichenberger, 1923 as a junior synonym of *Psittacus aureus* Gmelin, 1788. *E. aurea* occurs sympatrically with *E. cactorum* in northeastern Brazil.

***E. aurea* (Gmelin, 1788)**

Golden-crowned Parakeet Edwards, 1758. Gleanings of Natural History, p. 50, pl. 235.

Psittacus aureus Gmelin, 1788. Systema Naturae, I, p.329. Type specimen: missing. Type locality: Brazil.

Psittacus regulus Shaw, 1811. General Zoology, VIII, part 2, p. 453.

Psittacus canicularis Lichtenstein, 1823. Verzeichniss der Doubletten des Zoologischen Museums der Königl. Universität zu Berlin, p. 6.

Aratinga aureus Spix, 1824. Avium Species Novae, I, p. 37.

Aratinga canicularis Stephens, 1826. General Zoology, XIV, p. 139.

Conurus aureus Lesson, 1831. Traité d'Ornithologie, p. 214.

Sittace aurea Wagler, 1832. Monographia Psittacorum, p. 649.

Conurus canicularis Cabanis, 1848 in Schomburgk. Reisen in British-Guiana in der Jahren, III, p. 728.

Eupsittula aurea Bonaparte, 1854. Revue et Magasin de Zoologie, n°43, p. 150.

Eupsittula canicularis Bonaparte, 1854. Revue et Magasin de Zoologie, n°44, p. 150.

Eupsittaca aurea Cabanis, 1862. Journal fur Ornithologie, p. 335.

Conurus brasiliensis Finsch, 1863. Nederlandsch Tijdschrift voor de Dierkunde, I, p. 15.

Conurus aureus - Salvadori, 1891. Catalogue of the Birds in the British Museum, XX, p. 199.

Aratinga aureus - Brabourne & Chubb 1912. The Birds of South America, I, n° 766, p. 82.

Eupsittula aurea - Ridgway, 1916. Bulletin of the United States National Museum, VII, p. 164.

Eupsittacula aurea Miranda-Ribeiro, 1920. Revista do Museu Paulista, XII, p. 9.

Eupsittula aurea major Cherrie & Reichenberger, 1923. American Museum Novitates, no.58, p. 3.

Type: AMNH149401, adult male, Puerto Pinasco, Rio Paraguay, Paraguay, 20.x.1916, George K.Cherrie.

Eupsittula aurea aurea Cherrie & Reichenberger, 1923. American Museum Novitates, no.58, p. 3.

Aratinga aurea aurea Peters, 1937. Checklist of Birds of the World, III, p. 191.

Aratinga aurea major Peters, 1937. Checklist of Birds of the World, III, p. 191.

Diagnosis: characterized by black (Sepia 119) bill, orange (Burnt Orange 116) forehead, yellow (Orange Yellow 18) area around the eye; and light orange (Spectrum Orange 17) and blue (Cerulean Blue 67) crown. Nape is green (Parrot Green 260). Cheeks, upper throat and throat are grayish olive (Grayish Olive 43); while auriculars are grayish olive (Grayish Olive 43) with blue (Cerulean Blue 67) tinge.

Distribution: occurs in Suriname, Brazil, southerneast Peru, eastern Bolivia, Paraguay and northern Argentina.

3.6 The *Eupsittula cactorum* complex

When Kuhl (1820) described *E. cactorum* he based his description on some specimens collected at Vareda, Rio Pardo and near Os Possões, in southeastern Bahia, Brazil (Hellmayr 1929). Later, Spix (1824) described *A. flaviventer* and *A. caixana* as two separate species, but he suggested that they might be the same taxon. Moreover, he reported “Contendas in Minas Gerais, Juazeiro in Bahia and Piauí” as localities for *A. flaviventer*, whereas he did not mention any locality for *A. caixana*. Cory (1918) first considered *A. cactorum* polytypic and described *A. c. perpallida* as a new race from Ceará, Brazil that presents general plumage paler than nominotypic.

On the other hand, Hellmayr (1929) considered *A. c. perpallida* a junior synonym of *A. c. caixana* (Spix, 1824) and proposed “Caxias, Piauí” as its type locality. Also, he considered *A. flaviventer* a junior synonym of *A. c. cactorum* (Kuhl, 1820) and restricted its type locality to “Contendas or Juazeiro, Brazil”. According to Hellmayr, *A. c. caixana* is markedly paler, with lighter green upperparts, buffy citrine or olive lake throat and chest, and less orange center of belly than nominate. It ranges north of the São Francisco River, from Maranhão and Piauí east to Pernambuco and northwestern Bahia; while *A. c. cactorum* occurs south of the São Francisco

River. This treatment has been followed by all subsequent authors (Peters 1937; Pinto 1938, 1978; Arndt 1981; Forshaw 1989; Collar 1997; Juniper & Parr 1998; Forshaw 2010; Clements *et al.* 2014).

Our analysis revealed that the São Francisco River does not constitute a geographical barrier for *E. cactorum*. In fact, besides not differing in size (Appendix 5), both races sometimes can present paler plumage that does not relate to distribution, but it represents geographical variation within the taxon (Appendix 12). Moreover, analysis of type specimens of *A. c. perpallida* and *A. flaviventer* did not report any significant differences. All examined specimens present whitish bill, dull blue forehead and crown; green nape and auriculars. Cheeks, upper throat and throat are grayish, while belly is yellow. Therefore, we consider *A. flaviventer* Spix, 1824; *A. caixana* Spix, 1824 and *A. c. perpallida* Cory, 1918 as junior synonyms of *Psittacus cactorum* Kuhl, 1820.

***E. cactorum* (Kuhl, 1820)**

Psittacus cactorum Kuhl, 1820. *Conspectus Psittacorum*, p. 82. Type: AMNH6220, Brazil. Type locality: Vareda, Rio Pardo and near Os Possões, southeastern Bahia (Hellmayr 1929).

Aratinga flaviventer Spix, 1824. *Avium Species Novae*, I, p. 33, t. 18, figs. 1, 2. Types: ZSMB17, ZSMB17A, Contendas in Minas Gerais, Joazeiro in Bahia and Piauí, Brazil, Spix.

Aratinga caixana Spix, 1824. *Avium Species Novae*, I, p. 34, t. 19, f. 1 (var.). Type: ZSMB18, Brazil, Spix. Type locality: Caxias, Piauí, Brazil (Hellmayr 1929).

Sittace cactorum Wagler, 1832. *Monographia Psittacorum*, p. 651.

Conurus aeruginosus Gray, 1845. *Genera of Birds*, II, n° 12, p. 413.

Conurus cactorum Souancé, 1856. *Revue et Magasin de Zoologie*, p. 61.

Aratinga cactorum Brabourne & Chubb, 1912. *The Birds of South America*, I, n° 761, p. 82.

Aratinga cactorum cactorum Cory, 1918. *Catalogue of the Birds of the Americas*, II, p. 59.

Aratinga cactorum perpallida Cory, 1918. *Catalogue of the Birds of the Americas*, II, p. 59. Type: FMNH46988, male, Jua, near Iguatu, Ceará, Brazil, 7.viii.1913, R. H. Becker.

Gymnopsittacus cactorum Miranda-Ribeiro, 1920. *Revista do Museu Paulista*, XII, p. 9.

Aratinga cactorum caixana Hellmayr, 1929. *A contribution to the Ornithology of Northeastern Brazil*, Field Museum of Natural History, Publication 255, XII, No. 18, p. 441.

Aratinga cactorum cactorum - Hellmayr, 1929. A contribution to the Ornithology of Northeastern Brazil, Field Museum of Natural History, Publication 255, XII, No. 18, p. 441.

Diagnosis: diagnosed by whitish (Smoke Gray 45) bill, dull blue (Cerulean Blue 67) forehead and crown; and green (Parrot Green 260) nape and auriculars. Cheeks, upper throat and throat are grayish (Smoke Gray 45); while belly is yellow (Orange Yellow 18).

Distribution: endemic of Brazil, currently occurs in Piauí, Ceará, Rio Grande do Norte, Paraíba, Pernambuco, Alagoas, Bahia, Sergipe and Minas Gerais (WikiAves 2015).

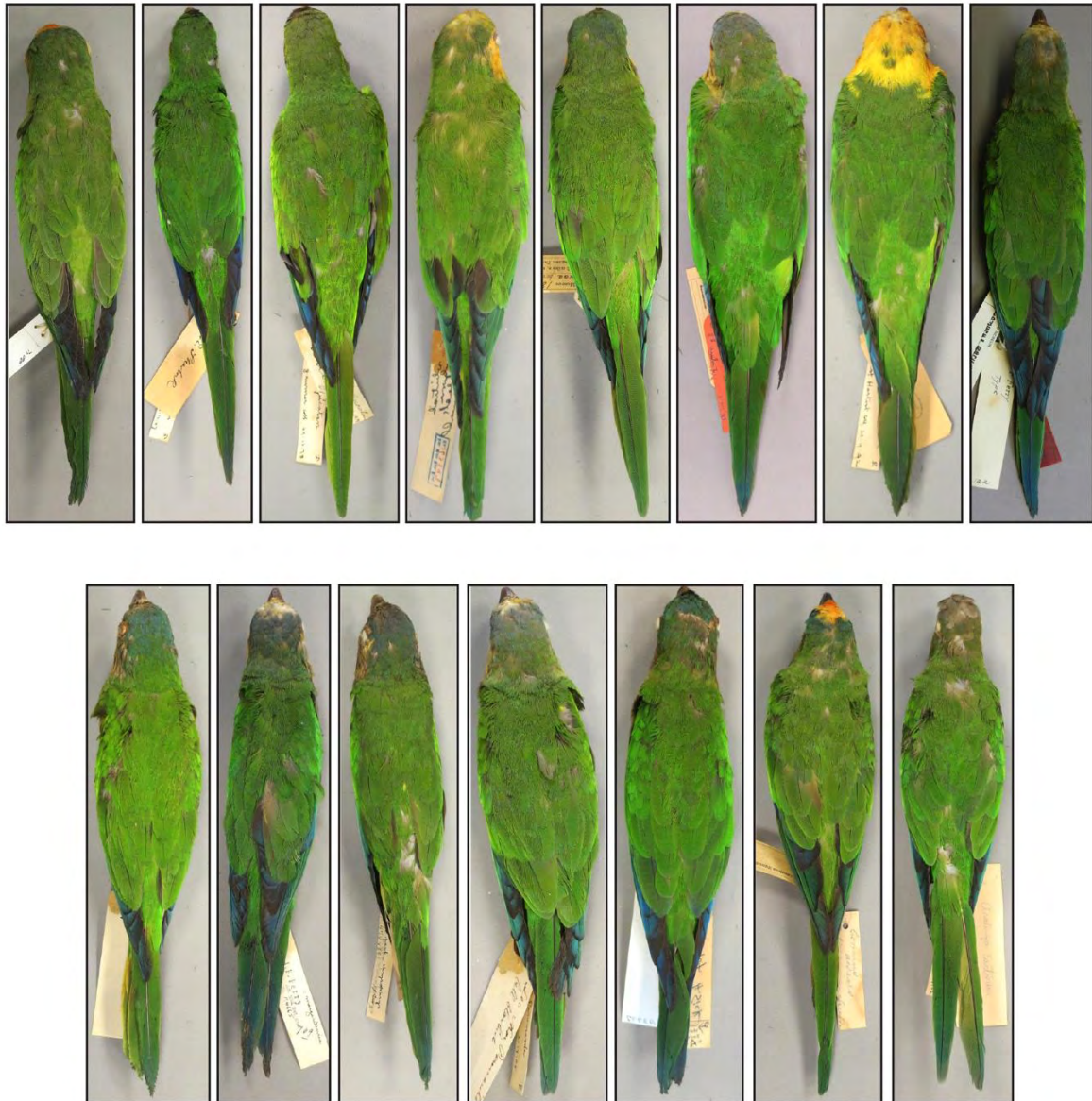


Figure 1. Dorsal view of the 15 species of *Eupsittula* showing that they all exhibit green dorsal neck, scapulars, folded secondaries; and green and paris green uppertail. From top left to bottom right: *E. canicularis* (Linnaeus, 1758), *E. astec* (Souancé, 1857), *E. nana* (Vigors, 1830), *E. pertinax* (Linnaeus, 1758), *E. ocellaris* (Sclater & Salvin, 1864), *E. arubensis* (Hartert, 1892), *E. xanthogenia* (Bonaparte, 1850), *E. tortugensis* (Cory, 1909), *E. aeruginosa* (Linnaeus, 1758), *E. margaritensis* (Cory, 1918), *E. chrysophrys* (Swainson, 1838), *E. surinama* (Zimmer & Phelps, 1951), *E. paraensis* (Lesson, 1844), *E. aurea* (Gmelin, 1788), *E. cactorum* (Kuhl, 1820).

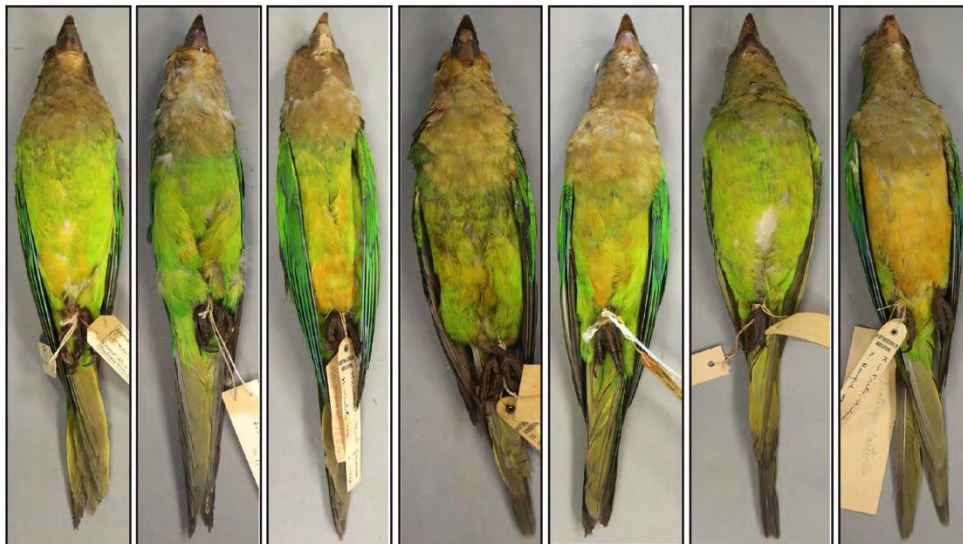


Figure 2. Frontal view of the 15 species of *Eupsittula* showing that they all exhibit black tarsus and grayish-olive undertail. From top left to bottom right: *E. canicularis* (Linnaeus, 1758), *E. astec* (Souancé, 1857), *E. nana* (Vigors, 1830), *E. pertinax* (Linnaeus, 1758), *E. ocularis* (Sclater & Salvin, 1864), *E. arubensis* (Hartert, 1892), *E. xanthogenia* (Bonaparte, 1850), *E. tortugensis* (Cory, 1909), *E. aeruginosa* (Linnaeus, 1758), *E. margaritensis* (Cory, 1918), *E. chrysophrys* (Swainson, 1838), *E. surinama* (Zimmer & Phelps, 1951), *E. paraensis* (Lesson, 1844), *E. aurea* (Gmelin, 1788), *E. cactorum* (Kuhl, 1820).

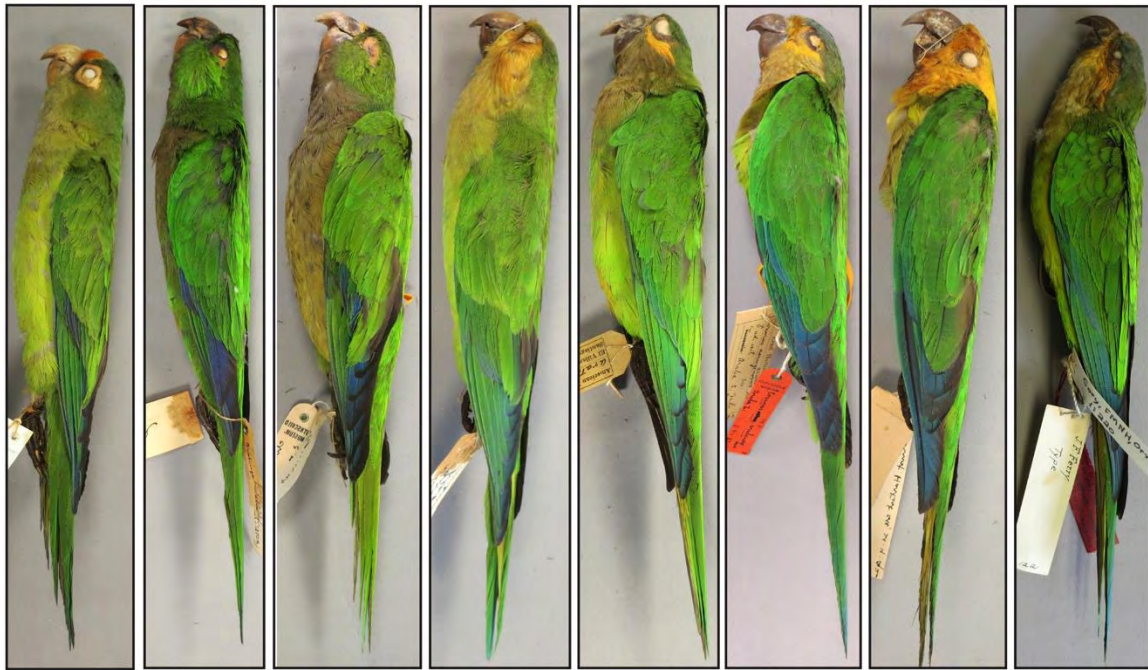


Figure 3. Lateral view of the 15 species of *Eupsittula*, showing that they all exhibit green bend of wing, lesser and median wing-coverts, greater secondary-coverts; green and blue carpal edge; and paris green and blue with black edges primaries and secondaries. From top left to bottom right: *E. canicularis* (Linnaeus, 1758), *E. astec* (Souancé, 1857), *E. nana* (Vigors, 1830), *E. pertinax* (Linnaeus, 1758), *E. ocellaris* (Sclater & Salvin, 1864), *E. arubensis* (Hartert, 1892), *E. xanthogenia* (Bonaparte, 1850), *E. tortugensis* (Cory, 1909), *E. aeruginosa* (Linnaeus, 1758), *E. margaritensis* (Cory, 1918), *E. chrysophrys* (Swainson, 1838), *E. surinama* (Zimmer & Phelps, 1951), *E. paraensis* (Lesson, 1844), *E. aurea* (Gmelin, 1788), *E. cactorum* (Kuhl, 1820).

3.7 Morphometric analyses

All analyses were performed first with the 25 taxa reported in the literature (Appendix 5) and second with the 15 species here proposed. Here are reported only results after the taxonomic revision. Data were not normally distributed, since the p-value in the Shapiro-Wilk test resulted to be less than the chosen alpha-level (0.05), therefore a non parametric Fligner-Killeen test was performed, that reported that variances of culmen (p-value= 0.002) and wing length (p-value < 0.0001) were not homogeneous. Moreover, in order to test for sexual dimorphism, a Kruskal-Wallis test was performed and reported significant differences in culmen length (p-value < 0.0001), wing length (p-value= 0.005) and width at base of bill (p-value < 0.0001). Particularly, culmen seems to be longer in males of *E. canicularis*, *E. astec*, *E. pertinax*, *E. ocularis*, *E. xanthogenia*, *E. chrysophrys*, *E. surinama*, *E. aurea* and *E. cactorum*. Width at base of bill is larger in males of *E. astec*, *E. ocularis*, *E. aeruginosa*, *E. chrysophrys*, *E. aurea*, and *E. cactorum*. Wing is longer in males of *E. xanthogenia*, *E. aeruginosa* and *E. chrysophrys* (Table 1).

Table 1. Wilcox test results of taxa exhibiting sexual dimorphism (p-value < 0.05).

Taxa	Sex	Culmen	Bill width	Wing
<i>canicularis</i>	male	0.027	-	-
<i>astec</i>	male	0.001	0.009	-
<i>pertinax</i>	male	0.005	-	-
<i>ocularis</i>	male	0.038	0.043	-
<i>xanthogenia</i>	male	0.001	-	0.011
<i>aeruginosa</i>	male	-	0.021	0.0007
<i>chrysophrys</i>	male	0.0005	0.029	0.023
<i>surinama</i>	male	0.023	-	-
<i>aurea</i>	male	0.0002	0.0001	-
<i>cactorum</i>	male	0.037	0.0003	-

Significant morphometric differences were found in the Kruskal-Wallis test for all measurements, therefore a pairwise comparisons using Wilcoxon rank sum was performed between pairs of taxa (Table 2). *E. aurea* seems to be the smallest species within the genus, whereas *E. nana* is largest (Table 3). In the principal component analysis (PCA) the first two principal components explained

66% of the variance between all taxa (Eigenvalue—66.84%). Particularly, the first component (40.92%) refers to culmen length and bill width; whereas the second (25.92%) refers to bill width and tarsus length. As we can see in the graph (Figure 5), the PCA showed overlap between all species, except for *E. nana* (bold blue circles).

Table 2. Pairwise comparisons between pairs of taxa using Wilcoxon rank sum test for 4 morphometric parameters. Ns = no significant difference; <0.05 = significant difference.

Taxa	Culmen	Bill width	Wing	Tarsus
<i>canicularis-astec</i>	Ns	Ns	<0.05	Ns
<i>canicularis-nana</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>canicularis-pertinax</i>	<0.0001	<0.0001	<0.05	<0.0001
<i>canicularis-ocularis</i>	<0.0001	<0.05	Ns	Ns
<i>canicularis-arubensis</i>	Ns	<0.05	Ns	Ns
<i>canicularis-xanthogenia</i>	<0.0001	Ns	<0.0001	Ns
<i>canicularis-tortugensis</i>	<0.05	<0.0001	<0.0001	Ns
<i>canicularis-aeruginosa</i>	<0.0001	<0.05	Ns	<0.05
<i>canicularis-margaritensis</i>	Ns	<0.0001	Ns	Ns
<i>canicularis-chrysophrys</i>	<0.05	<0.0001	Ns	<0.05
<i>canicularis-surinama</i>	<0.05	<0.05	Ns	Ns
<i>canicularis-paraensis</i>	Ns	Ns	Ns	Ns
<i>canicularis-aurea</i>	<0.0001	<0.0001	<0.0001	Ns
<i>canicularis-cactorum</i>	Ns	<0.0001	<0.05	Ns
<i>astec-nana</i>	<0.0001	<0.0001	<0.05	<0.0001
<i>astec-pertinax</i>	<0.0001	<0.0001	Ns	<0.0001
<i>astec-ocularis</i>	<0.0001	<0.0001	Ns	Ns
<i>astec-arubensis</i>	Ns	<0.05	Ns	Ns
<i>astec-xanthogenia</i>	<0.0001	Ns	Ns	Ns
<i>astec-tortugensis</i>	<0.05	<0.0001	<0.05	Ns
<i>astec-aeruginosa</i>	<0.0001	<0.0001	Ns	<0.05
<i>astec-margaritensis</i>	Ns	<0.0001	Ns	Ns
<i>astec-chrysophrys</i>	Ns	<0.0001	Ns	<0.05
<i>astec-surinama</i>	<0.05	<0.0001	Ns	Ns
<i>astec-paraensis</i>	Ns	Ns	Ns	Ns
<i>astec-aurea</i>	<0.0001	<0.0001	<0.0001	Ns
<i>astec-cactorum</i>	Ns	<0.0001	Ns	Ns
<i>nana –pertinax</i>	<0.0001	<0.0001	<0.05	Ns
<i>nana –ocularis</i>	<0.0001	<0.0001	<0.0001	<0.05
<i>nana –arubensis</i>	<0.0001	<0.05	<0.05	Ns
<i>nana –xanthogenia</i>	Ns	<0.0001	Ns	Ns
<i>nana –tortugensis</i>	<0.0001	<0.0001	<0.05	Ns
<i>nana –aeruginosa</i>	<0.0001	<0.0001	<0.0001	Ns
<i>nana –margaritensis</i>	<0.0001	<0.0001	<0.05	<0.0001
<i>nana –chrysophrys</i>	<0.0001	<0.0001	<0.0001	<0.05
<i>nana –surinama</i>	<0.0001	<0.0001	<0.0001	Ns
<i>nana –paraensis</i>	Ns	Ns	Ns	Ns

Taxa	Culmen	Bill width	Wing	Tarsus
<i>nana-aurea</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>nana-cactorum</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>pertinax-ocularis</i>	Ns	Ns	Ns	Ns
<i>pertinax-arubensis</i>	Ns	Ns	Ns	Ns
<i>pertinax-xanthogenia</i>	<0.0001	<0.0001	Ns	Ns
<i>pertinax-tortugensis</i>	Ns	Ns	<0.05	Ns
<i>pertinax-aeruginosa</i>	Ns	Ns	Ns	Ns
<i>pertinax-margaritensis</i>	Ns	Ns	Ns	Ns
<i>pertinax-chrysophrys</i>	Ns	Ns	Ns	Ns
<i>pertinax-surinama</i>	Ns	Ns	Ns	Ns
<i>pertinax-paraensis</i>	Ns	Ns	Ns	Ns
<i>pertinax-aurea</i>	<0.0001	<0.0001	<0.0001	<0.05
<i>pertinax-cactorum</i>	<0.0001	Ns	Ns	<0.05
<i>ocularis-arubensis</i>	Ns	Ns	Ns	Ns
<i>ocularis-xanthogenia</i>	<0.0001	<0.05	<0.05	Ns
<i>ocularis-tortugensis</i>	Ns	<0.05	<0.0001	Ns
<i>ocularis-aeruginosa</i>	Ns	Ns	Ns	Ns
<i>ocularis-margaritensis</i>	Ns	Ns	Ns	Ns
<i>ocularis-chrysophrys</i>	<0.05	<0.05	Ns	Ns
<i>ocularis-surinama</i>	Ns	Ns	Ns	Ns
<i>ocularis-paraensis</i>	Ns	Ns	Ns	Ns
<i>ocularis-aurea</i>	<0.0001	<0.0001	<0.0001	Ns
<i>ocularis-cactorum</i>	<0.0001	<0.05	Ns	Ns
<i>arubensis-xanthogenia</i>	<0.05	<0.05	Ns	Ns
<i>arubensis-tortugensis</i>	Ns	Ns	<0.05	Ns
<i>arubensis-aeruginosa</i>	Ns	Ns	Ns	Ns
<i>arubensis-margaritensis</i>	Ns	Ns	Ns	Ns
<i>arubensis-chrysophrys</i>	Ns	Ns	Ns	Ns
<i>arubensis-surinama</i>	Ns	Ns	Ns	Ns
<i>arubensis-paraensis</i>	Ns	Ns	Ns	Ns
<i>arubensis-aurea</i>	<0.05	Ns	<0.0001	Ns
<i>arubensis-cactorum</i>	Ns	Ns	Ns	Ns
<i>xanthogenia-tortugensis</i>	<0.05	<0.05	Ns	Ns
<i>xanthogenia-aeruginosa</i>	<0.0001	<0.05	<0.05	Ns
<i>xanthogenia-margaritensis</i>	<0.0001	<0.0001	<0.05	Ns
<i>xanthogenia-chrysophrys</i>	<0.0001	<0.0001	<0.05	Ns
<i>xanthogenia-surinama</i>	<0.0001	<0.05	<0.05	Ns
<i>xanthogenia-paraensis</i>	Ns	Ns	Ns	Ns
<i>xanthogenia-aurea</i>	<0.0001	<0.0001	<0.05	Ns
<i>xanthogenia-cactorum</i>	<0.0001	<0.0001	<0.05	Ns
<i>tortugensis-aeruginosa</i>	Ns	Ns	<0.0001	Ns
<i>tortugensis-margaritensis</i>	Ns	Ns	<0.0001	Ns
<i>tortugensis-chrysophrys</i>	Ns	Ns	<0.0001	Ns
<i>tortugensis-surinama</i>	Ns	Ns	<0.0001	Ns
<i>tortugensis-paraensis</i>	Ns	Ns	Ns	Ns
<i>tortugensis-aurea</i>	<0.0001	Ns	Ns	Ns
<i>tortugensis-cactorum</i>	<0.05	Ns	<0.0001	Ns
<i>aeruginosa-margaritensis</i>	Ns	Ns	Ns	Ns
<i>aeruginosa-chrysophrys</i>	Ns	Ns	Ns	Ns
<i>aeruginosa-surinama</i>	Ns	Ns	Ns	Ns

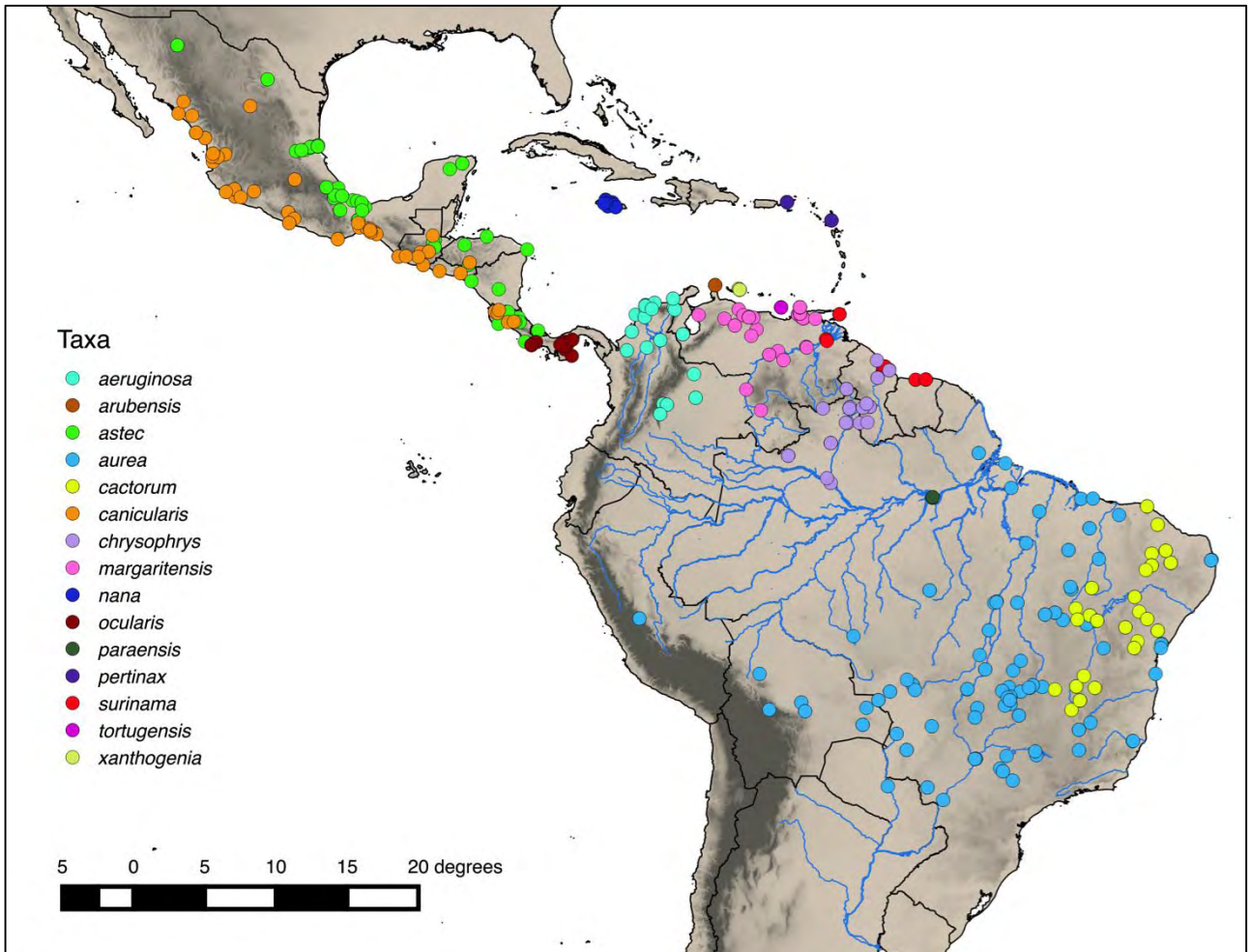
Taxa	Culmen	Bill width	Wing	Tarsus
<i>aeruginosa –paraensis</i>	Ns	Ns	Ns	Ns
<i>aeruginosa-aurea</i>	<0.0001	<0.0001	<0.0001	Ns
<i>aeruginosa –cactorum</i>	<0.0001	Ns	Ns	Ns
<i>margaritensis –chrysophrys</i>	Ns	Ns	Ns	Ns
<i>margaritensis –surinama</i>	Ns	Ns	Ns	Ns
<i>margaritensis –paraensis</i>	Ns	Ns	Ns	Ns
<i>margaritensis-aurea</i>	<0.0001	<0.0001	<0.0001	Ns
<i>margaritensis –cactorum</i>	Ns	Ns	Ns	Ns
<i>chrysophrys –surinama</i>	Ns	Ns	Ns	Ns
<i>chrysophrys –paraensis</i>	Ns	Ns	Ns	Ns
<i>chrysophrys-aurea</i>	<0.0001	<0.0001	<0.0001	<0.05
<i>chrysophrys –cactorum</i>	Ns	Ns	Ns	Ns
<i>surinama –paraensis</i>	Ns	Ns	Ns	Ns
<i>surinama-aurea</i>	<0.0001	<0.0001	<0.0001	Ns
<i>surinama –cactorum</i>	<0.05	Ns	Ns	Ns
<i>paraensis-aurea</i>	Ns	Ns	Ns	Ns
<i>paraensis-cactorum</i>	Ns	Ns	Ns	Ns
<i>aurea-cactorum</i>	<0.0001	<0.0001	<0.0001	Ns

Table 3. Morphological measurements (mm) as mean and standard deviation (first row) and minimum and maximum values (second row) for male and female of each the 15 recognized taxa.

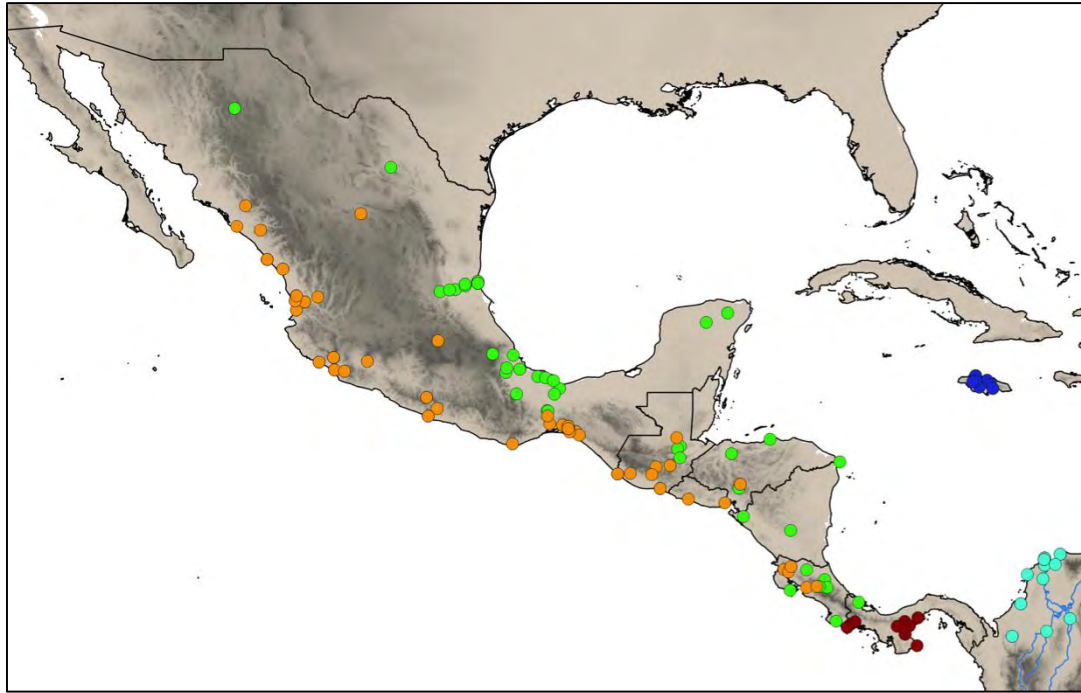
Taxa	Bill width M	Bill width F	Culmen M	Culmen F	Wing M	Wing F	Tarsus M	Tarsus F
<i>canicularis</i>	12.13±0.58 (10.74-12.44)	11.90±0.58 (10.75-12.28)	18.15±0.77 (15.72-19.58)	17.72±0.92 (15.05-19.35)	134.3±4.33 (125-137)	133.3±4.27 (123-135.5)	13.09±0.80 (11.36-15.08)	12.95±0.49 (11.36-13.09)
<i>astec</i>	12.35±0.47 (11.24-12.68)	12.04±0.46 (11.28-12.32)	18.34±0.76 (16.53-19.88)	17.77±0.53 (16.64-18.54)	138.4±5.49 (127-143)	135.9±4.90 (127-139)	13.05±0.75 (11.40-14.85)	12.96±0.80 (11.58-14.42)
<i>nana</i>	13.82±0.36 (13.20-13.99)	13.58±0.79 (11.35-13.94)	21.76±0.58 (20.60-22.55)	21.40±0.67 (19.82-22.38)	141.2±2.81 (138-142)	141±3.22 (134-142)	13.80±0.84 (12.01-14.64)	14.35±0.78 (13.04-15.39)
<i>pertinax</i>	11.34±0.48 (10.52-11.61)	11.07±0.48 (10.34-11.31)	19.68±1.72 (18.06-25.32)	18.51±0.83 (17.19-19.75)	138.1±4.55 (130-140)	136.2±3.81 (130-138)	13.79±0.79 (12.30-15.74)	13.55±0.41 (12.53-13.98)
<i>ocularis</i>	11.77±1.052 (10.75-12.12)	11.42±0.42 (10.60-11.67)	19.28±0.63 (18.14-20.29)	18.86±0.53 (17.74-19.53)	135.2±3.07 (130-137)	133.2±3.79 (126-136)	13.31±0.80 (11.57-14.10)	13.34±0.69 (11.65-14.53)
<i>arubensis</i>	11.33±0.33 (10.99-11.54)	11.19±0.67 (10.41-11.72)	18.42±0.69 (17.35-19.04)	18.97±0.79 (17.99-20.07)	136.8±2.16 (135-138)	131.8±4.71 (128-131)	13.35±0.76 (12.42-14.54)	13.09±0.91 (11.66-13.88)
<i>xanthogenia</i>	11.69±0.52 (10.64-12.05)	12.04±0.46 (11.39-11.42)	22±1.31 (19.76-25.18)	20.42±0.75 (19.04-21.90)	143±4.61 (137-145)	138.1±3.47 (133-139)	13.53±0.52 (12.54-14.59)	13.54±0.62 (12.49-14.87)
<i>tortugensis</i>	10.84±0.60 (10.19-11.09)	11.14±0.39 (10.50-11.39)	19.45±0.69 (18.82-20.42)	18.90±0.43 (17.95-19.28)	145.2±2.06 (143-145.8)	144.8±2.54 (141-145.2)	13.90±1.05 (13.02-15.40)	13.98±0.60 (12.80-14.75)
<i>aeruginosa</i>	11.69±0.52 (10.64-12.05)	11.09±0.76 (9.08-11.62)	18.91±0.77 (17.11-20.08)	18.61±0.44 (17.48-19.22)	137.1±2.93 (131-138)	133.6±2.59 (130-135)	13.53±0.94 (11.10-15.26)	13.61±0.73 (11.88-14.50)

Taxa	Bill width M	Bill width F	Culmen M	Culmen F	Wing M	Wing F	Tarsus M	Tarsus F
<i>margaritensis</i>	11.46±0.54 (10.14-11.89)	11.33±0.49 (10.51-11.68)	18.41±1.06 (15.87-20.27)	18.44±1.06 (16.32-20.27)	135.7±5.23 (126-139.5)	134.7±4.42 (127-138)	13.31±0.82 (10.89-15.18)	12.78±0.67 (11.58-14.42)
<i>chrysophrys</i>	11.49±0.54 (10.73-11.91)	11.11±0.46 (10.17-11.41)	18.94±1.05 (15.60-21.24)	17.97±1.45 (11.73-19.76)	136.1±4.44 (127-139.5)	133.3±4.05 (126-135)	13.27±0.81 (11.57-14.36)	13.27±0.76 (11.73-15.21)
<i>surinama</i>	11.40±0.55 (10.57-11.81)	11.34±0.37 (10.79-11.58)	19.01±0.80 (17.19-19.91)	18.31±0.34 (17.97-18.76)	135.3±3.22 (130-136.5)	132.9±1.57 (131-134)	13.57±1.05 (11.32-15.53)	13.46±0.51 (12.32-13.89)
<i>paraensis</i>	11.42±0.86 (10.81-11.73)	no females	19.70±0.91 (19.06-20.35)	no females	142±4.24 (139-143.5)	no females	13.66±0.24 (13.49-13.84)	no females
<i>aurea</i>	10.91±0.43 (9.90-11.21)	10.64±0.47 (8.73-11)	17.57±0.93 (14.17-19.75)	17.17±0.69 (15.58-19.83)	147.8±5.92 (135-152)	146.8±6.18 (135-152)	13.09±0.88 (10.60-15.04)	13.15±0.75 (11.72-15.17)
<i>cactorum</i>	11.47±0.51 (10.12-11.79)	11.12±0.50 (8.92-11.38)	18.23±0.78 (15.95-19.77)	17.93±0.73 (15.67-19.32)	136.6±3.62 (129-146)	135.3±3.36 (129-142)	13.23±0.71 (11.55-14.56)	11.34±0.62 (10.99-14.26)

(A)



(B)



(C)

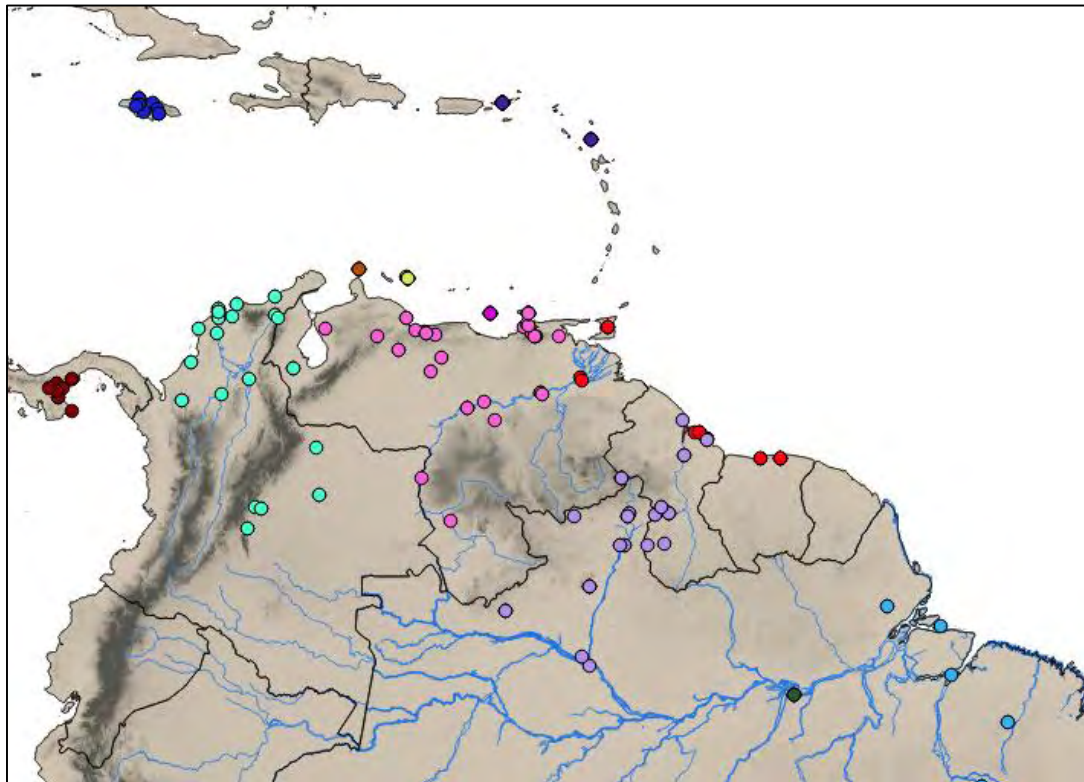


Figure 4. (A), (B), (C) Distribution of analyzed specimens of *Eupsittula* with locality information on label. Orange: *E. canicularis*, light green: *E. astec*, dark red: *E. ocularis*, dark blue: *E. nana*, dark purple: *E. pertinax*, brown: *E. arubensis*, light yellow: *E. xanthogenia*, light blue: *E. aeruginosa*, light purple: *E. tortugensis*, pink: *E. margaritensis*, red: *E. surinama*, lavender: *E. chrysophrys*, dark green: *E. paraensis*, blue: *E. aurea*, yellow: *E. cactorum*.

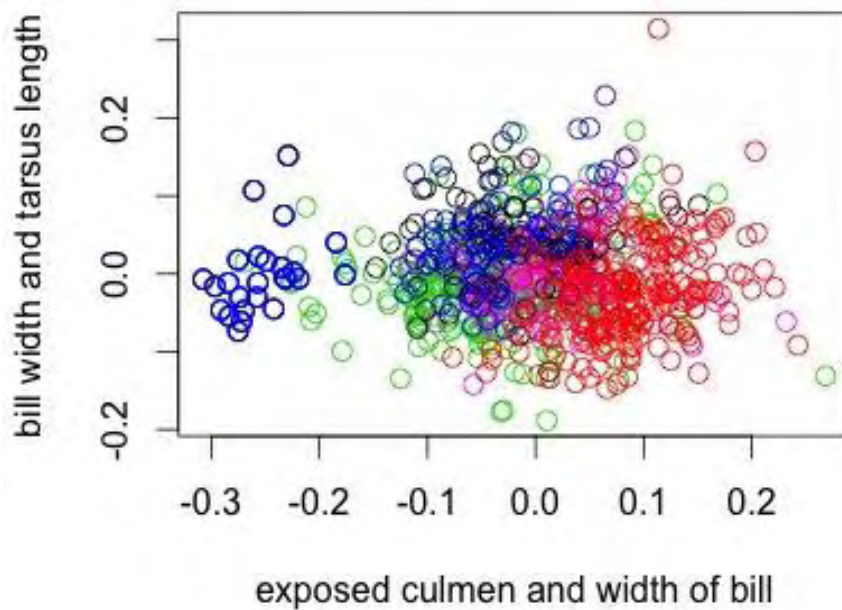


Figure 5. Results of the principal component analysis (Eigenvalue-66.84%). Red circles: *E. aurea* complex, blue circles: *E. nana* complex (where bold circles represent *E. nana*), black circles: *E. cactorum* complex, green circles: *E. pertinax* complex, purple: *E. canicularis* complex.

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APPENDICES

Appendix 1. List of analyzed specimens, where “NA” refers to missing data.

Taxon	Number	Sex	Country	State/Region	Locality
<i>vicinalis</i>	AMNH804996	M	Mexico	Tamaulipas	Tampico
<i>nana</i>	AMNH474529	F	Jamaica		Trelawny
<i>nana</i>	AMNH474532	M	Jamaica		Falmouth
<i>nana</i>	AMNH44723	NA	Jamaica		Spanishtown
<i>nana</i>	AMNH474527	M	Jamaica		Trelawny
<i>nana</i>	AMNH474533	M	Jamaica		Falmouth
<i>nana</i>	AMNH474535	F	Jamaica		Falmouth
<i>nana</i>	AMNH474530	F	Jamaica		Trelawny
<i>nana</i>	AMNH230310	F	captivity	New York	Zoological Park
<i>nana</i>	AMNH474526	M	Jamaica		Trelawny
<i>nana</i>	USNM354360	F	Jamaica		Lumsden, near Claremont
<i>nana</i>	USNM354361	M	Jamaica	Trelawney	Baron Hill
<i>nana</i>	USNM354359	F	Jamaica		Baron Hill
<i>nana</i>	USNM191515	NA	Jamaica		Crown lands
<i>nana</i>	USNM38002	M	Jamaica		Spanish Town
<i>nana</i>	USNM233462	M	Jamaica		Falmouth
<i>nana</i>	USNM191516	F	Jamaica		Crown lands
<i>nana</i>	USNM191514	F	Jamaica	NA	NA
<i>nana</i>	USNM233463	F	Jamaica		Falmouth
<i>nana</i>	FMNH40321	F	Jamaica	Middlesex	St.Thomas Vale
<i>nana</i>	BMNH46.5.26.18	NA	Jamaica	NA	NA
<i>nana</i>	BMNH1905.1.14.3	NA	Jamaica		Mandeville
<i>nana</i>	BMNH46.5.26.17	NA	Jamaica	NA	NA
<i>nana</i>	BMNH90.6.1.71	NA	Jamaica		Trelawny
<i>nana</i>	BMNH70.4.13.10	F	Jamaica		Spanishtown
<i>nana</i>	BMNH89.1.30.127	M	Jamaica		Freeman's Hall, Trelawny
<i>nana</i>	LSUMZ142060	M	Jamaica		Trelawny Park
<i>astec</i>	AMNH233593	M	Panama	Bocas del Toro	Almirante
<i>astec</i>	BMNH1859.11.22.58	NA	Mexico	NA	NA
<i>vicinalis</i>	AMNH804996	M	Mexico	Tamaulipas	Tampico
<i>astec</i>	AMNH106209	M	Mexico	Oaxaca	Rio Givicia
<i>astec</i>	AMNH103300	M	Nicaragua		Rio Coco, Wanks River
<i>astec</i>	AMNH474514	M	Mexico	Yucatan	Chable
<i>astec</i>	AMNH389268	M	Costa Rica		Guapilez
<i>astec</i>	AMNH389270	M	Costa Rica		Val. Turrialba, Faz. La Iberia
<i>astec</i>	AMNH776271	F	Mexico	Oaxaca	Sarabia
<i>astec</i>	AMNH326006	F	Honduras		Caliche, Orica, Tegucigalpa
<i>astec</i>	AMNH393737	M	Guatemala		Secanquim
<i>astec</i>	AMNH406627	F	Guatemala		Chimoxan
<i>astec</i>	AMNH393738	F	Guatemala		Secanquim
<i>astec</i>	USNM204350	M	Mexico	Tabasco	San Juan Bautista

<i>vicinalis</i>	USNM359638	M	Mexico	Veracruz	Tres Zapotes Camp
<i>astec</i>	USNM120266	M	Honduras		Santa Ana
<i>astec</i>	USNM120267	M	Honduras		Santa Ana
<i>astec</i>	USNM126331	M	Costa Rica		Rio Frio
<i>astec</i>	USNM128382	M	Nicaragua		Escondido River
<i>astec</i>	USNM487702	M	Mexico	Oaxaca	Sarabia
<i>astec</i>	USNM112586	M	Honduras		Trujillo
<i>astec</i>	USNM155371	F	Mexico	Veracruz	Motzorongo
<i>astec</i>	USNM192766	F	Costa Rica		La Concepcion
<i>astec</i>	FMNH122791	F	Mexico	Vera Cruz	Puerta Nacional
<i>astec</i>	FMNH187111	M	Mexico	Vera Cruz	Oiochico
<i>astec</i>	FMNH40256	F	Mexico	Yucatan	NA
<i>astec</i>	FMNH40258	M	Mexico	Yucatan	NA
<i>astec</i>	FMNH40255	F	Mexico	Yucatan	NA
<i>astec</i>	FMNH110228	M	Mexico	Yucatan	Itza
<i>vicinalis</i>	MCZ48482	M	Mexico	Tamaulipas	NA
<i>vicinalis</i>	LSUMZ7486	M	Mexico	Tamaulipas	Alta Mira
<i>vicinalis</i>	LSUMZ7485	F	Mexico	Tamaulipas	Alta Mira
<i>vicinalis</i>	LSUMZ10958	F	Mexico	San Luis Potosi	10 mi W Ebano, Hacienda Limon, 45 ft
<i>vicinalis</i>	LSUMZ16429	F	Mexico	San Luis Potosi	Ebano
<i>vicinalis</i>	LSUMZ10957	F	Mexico	San Luis Potosi	Laguna, 3 mi E Tamuin
<i>vicinalis</i>	LSUMZ16772	F	Mexico	San Luis Potosi	NA
<i>vicinalis</i>	LSUMZ16773	M	Mexico	San Luis Potosi	10.5 mi W of Ebano
<i>vicinalis</i>	LSUMZ10959	M	Mexico	San Luis Potosi	Ebano at Cerro La pez
<i>vicinalis</i>	LSUMZ16774	M	Mexico	San Luis Potosi	Puente de Dios, Rio Santa maria
<i>vicinalis</i>	LSUMZ16428	M	Mexico	San Luis Potosi	19 km W Ebano
<i>vicinalis</i>	LSUMZ16775	F	Mexico	San Luis Potosi	Valles
<i>astec</i>	LSUMZ100185	M	Mexico	Veracruz	Minatitlan
<i>astec</i>	LSUMZ140377	M	Mexico	Veracruz	NE Catemaco
<i>astec</i>	LSUMZ39659	M	Mexico	Veracruz	La Gloria, 45 mi S of Acayucan
<i>astec</i>	LSUMZ2833	M	Mexico	Veracruz	Piedras Negras
<i>astec</i>	LSUMZ48666	NA	Mexico	Vera Cruz	Ocotal Chico, 1900 ft
<i>astec</i>	LSUMZ2834	M	Mexico	Veracruz	Piedras Negras
<i>astec</i>	LSUMZ2832	F	Mexico	Veracruz	Piedras Negras
<i>astec</i>	LSUMZ24297	M	Mexico	Oaxaca	1 mi SW Valle Nacional
<i>astec</i>	BMNH99.6.30.465	M	Guatemala	Tierra Caliente	Sierra de las Minas
<i>astec</i>	BMNH45.11.2.14	F	Honduras	NA	NA
<i>astec</i>	BMNH1900.7.30.76	F	Costa Rica		Jiminez
<i>astec</i>	BMNH96.12.1.95	M	Nicaragua	La Libertad	Chontales
<i>astec</i>	BMNH89.1.30.130	NA	Mexico	Northern Yucatan	NA
<i>astec</i>	BMNH96.12.1.77	F	Mexico	Canton de Cordova	San Lorenzo
<i>astec</i>	BMNH90.vi.1.74	NA	Belize	NA	NA
<i>vicinalis</i>	BMNH96.12.1.96	M	Mexico	Tamaulipas	Tampico

<i>astec</i>	BMNH89.1.30.128	NA	Mexico	Veracruz	Veracruz
<i>astec</i>	MNHN451	F	Mexico	Yucatan	Chable
<i>astec</i>	MNHN450	M	Costa Rica		San Carlos
<i>astec</i>	MNHN452	M	Mexico	Yucatan	NA
<i>astec</i>	MNHN453	F	Mexico	Yucatan	NA
<i>astec</i>	MNHN447	M	Mexico	Yucatan	NA
<i>astec</i>	MNHN449	NA	Mexico	Yucatan	NA
<i>vicinalis</i>	USNM363476	M	Mexico	Tamaulipas	Gomez Farias
<i>vicinalis</i>	FMNH12252	F	Mexico	Tamaulipas	Tampico
<i>vicinalis</i>	FMNH12248	M	Mexico	Tamaulipas	Tampico
<i>vicinalis</i>	FMNH12242	M	Mexico	Tamaulipas	Tampico
<i>vicinalis</i>	FMNH13429	M	Mexico	Tamaulipas	Tampico
<i>vicinalis</i>	FMNH12244	M	Mexico	Tamaulipas	Tampico
<i>vicinalis</i>	FMNH12250	M	Mexico	Tamaulipas	Tampico
<i>vicinalis</i>	FMNH12640	M	Mexico	Tamaulipas	Tampico
<i>vicinalis</i>	FMNH12251	M	Mexico	Tamaulipas	Tampico
<i>vicinalis</i>	FMNH12257	F	Mexico	Tamaulipas	Tampico
<i>vicinalis</i>	FMNH12256	F	Mexico	Tamaulipas	Tampico
<i>clarae</i>	MLZ4343	F	Mexico	Sinaloa	El Mulino
<i>clarae</i>	AMNH91219	F	Mexico	Sinaloa	Arroyo de Lemones
<i>clarae</i>	AMNH91213	F	Mexico	Sinaloa	Cosala
<i>clarae</i>	AMNH71559	F	Mexico	Sinaloa	Escuinapa
<i>eburnirostrum</i>	AMNH776275	F	Mexico	Oaxaca	Rancho Sol y Luna, 8 mi NW Tapanatepec
<i>clarae</i>	AMNH474569	M	Mexico	Jalisco	Terro Tepic, Sierra de Alica
<i>clarae</i>	AMNH474572	F	Mexico	Jalisco	Las Penas
<i>eburnirostrum</i>	AMNH781192	NA	Mexico	Oaxaca	20 mi NW of La Ventosa
<i>clarae</i>	AMNH91221	F	Mexico	Sinaloa	Juanna Gomez
<i>canicularis</i>	AMNH781190	M	Mexico	NA	NA
<i>canicularis</i>	AMNH813258	M	Guatemala	Santa Rosa	La Avellana
<i>canicularis</i>	AMNH71563	M	Mexico	NA	NA
<i>clarae</i>	AMNH474568	F	Mexico	Jalisco	Terro Tepic, Sierra de Nayarit
<i>eburnirostrum</i>	AMNH776294	M	Mexico	Oaxaca	Rancho Sol y Luna, 8 mi NW Tapanatepec
<i>canicularis</i>	AMNH813261	M	Guatemala	Jutlapa	Montufar, El Paraiso
<i>canicularis</i>	AMNH393735	M	Guatemala		Ocos
<i>canicularis</i>	AMNH393731	F	Guatemala		Ocos
<i>clarae</i>	AMNH91218	F	Mexico	Sinaloa	Escuinapa
<i>canicularis</i>	AMNH775910	F	Mexico	Oaxaca	Chiapas line, 10 mi E Tapanatepec
<i>clarae</i>	AMNH71560	F	Mexico	Sinaloa	Escuinapa
<i>clarae</i>	USNM51443	M	Mexico	Sinaloa	Mazatlan
<i>clarae</i>	USNM51445	F	Mexico	Sinaloa	Mazatlan
<i>clarae</i>	USNM55415	NA	Mexico	Sinaloa	Mazatlan
<i>canicularis</i>	USNM307929	M	captivity	NA	NA
<i>canicularis</i>	USNM126609	M	Mexico	NA	NA
<i>canicularis</i>	USNM126608	M	Mexico	NA	NA

<i>clarae</i>	USNM164445	M	Mexico	Sinaloa	Mazatlan
<i>clarae</i>	USNM29318	M	Mexico	Colima	NA
<i>clarae</i>	USNM155376	F	Mexico	Colima	Manzanillo Bay
<i>clarae</i>	USNM164447	F	Mexico	Sinaloa	Mazatlan
<i>clarae</i>	USNM164448	M	Mexico	Durango	Chacala
<i>eburnirostrum</i>	USNM30112	F	Mexico	Colima	Manzanillo Bay
<i>eburnirostrum</i>	FMNH12241	M	Mexico	Guerrero	Apipilulco
<i>eburnirostrum</i>	FMNH13430	M	Mexico	Guerrero	Apipilulco
<i>eburnirostrum</i>	FMNH12239	F	Mexico	Guerrero	Apipilulco
<i>eburnirostrum</i>	FMNH12240	F	Mexico	Guerrero	Apipilulco
<i>eburnirostrum</i>	FMNH40254	M	Mexico	Oaxaca	Cacoprieto
<i>eburnirostrum</i>	FMNH102545	M	Mexico	Michoacan	Apatzingan
<i>eburnirostrum</i>	FMNH102546	M	Mexico	Michoacan	Apatzingan
<i>eburnirostrum</i>	BMNH96.12.1.111	F	Mexico	Guerrero	Tierra Colorada, 2000 ft
<i>eburnirostrum</i>	BMNH96.12.1.110	NA	Mexico	Guerrero	Acapulco
<i>eburnirostrum</i>	BMNH96.12.1.109	F	Mexico	Guerrero	Acapulco
<i>eburnirostrum</i>	BMNH90.6.1.56	NA	Mexico	NA	NA
<i>eburnirostrum</i>	BMNH96.12.1.112	NA	Mexico	Guerrero	Dos Arroyos, 1000 ft
<i>eburnirostrum</i>	MNHN26	M	Mexico	Michoacan	Coahuayana
<i>eburnirostrum</i>	MNHN27	F	Mexico	Michoacan	Coahuayana
<i>eburnirostrum</i>	MNHN28	F	Mexico	Michoacan	Coahuayana
<i>canicularis</i>	FMNH371835	M	captivity	NA	NA
<i>clarae</i>	FMNH12724	M	Mexico	Colima	Colima
<i>clarae</i>	BMNH89.1.30.102	M	Mexico	Sinaloa	Mazatlan
<i>clarae</i>	BMNH89.1.30.103	F	Mexico	Sinaloa	Mazatlan
<i>clarae</i>	BMNH96.12.1.113	F	Mexico	Colima	Plains of Colima
<i>clarae</i>	BMNH89.1.30.104	M	Mexico	Colima	Plains of Colima
<i>canicularis</i>	BMNH59.11.22.6	NA	Mexico	NA	NA
<i>clarae</i>	BMNH96.12.1.103	M	Mexico	Nayarit	Terr. De Tepic, San Blas
<i>clarae</i>	BMNH96.12.1.100	M	Mexico	Nayarit	Terr. De Tepic, Santiago
<i>clarae</i>	BMNH96.12.1.99	M	Mexico	Nayarit	Terr. De Tepic, Santiago
<i>clarae</i>	BMNH96.12.1.101	F	Mexico	Nayarit	Terr. De Tepic, San Blas
<i>clarae</i>	BMNH96.12.1.107	F	Mexico	Colima	Colima
<i>canicularis</i>	FMNH208679	M	Mexico	Chiapas	40 mi NW of Arriaga, Hacienda Monserrate
<i>canicularis</i>	FMNH208676	F	Mexico	Chiapas	40 mi NW of Arriaga, Hacienda Monserrate
<i>canicularis</i>	FMNH208680	F	Mexico	Chiapas	40 mi NW of Arriaga, Hacienda Monserrate
<i>canicularis</i>	FMNH208677	M	Mexico	Chiapas	40 mi NW of Arriaga, Hacienda Monserrate
<i>canicularis</i>	FMNH208678	M	Mexico	Chiapas	40 mi NW of Arriaga, Hacienda Monserrate
<i>canicularis</i>	FMNH208675	M	Mexico	Chiapas	40 mi NW of Arriaga, Hacienda Monserrate
<i>canicularis</i>	AMNH813257	NA	Guatemala	Santa Rosa	La Avellana
<i>eburnirostrum</i>	AMNH775911	F	Mexico	Oaxaca	Rio Ostuta, 4 mi W Zanatepec
<i>canicularis</i>	AMNH393729	M	Guatemala		Ocos

<i>canicularis</i>	AMNH704429	M	Mexico	NA	NA
<i>canicularis</i>	AMNH813260	M	Guatemala	Santa Rosa	La Avellana
<i>canicularis</i>	AMNH393730	M	Guatemala		Ocos
<i>canicularis</i>	AMNH389275	M	Costa Rica		Orotina
<i>canicularis</i>	AMNH474584	NA	Guatemala		Vera Paz
<i>canicularis</i>	AMNH474567	M	Mexico		Sierra de Nayerit
<i>canicularis</i>	AMNH393733	F	Guatemala		Ocos
<i>canicularis</i>	AMNH393726	F	Guatemala		Progreso
<i>canicularis</i>	AMNH813256	M	Guatemala	Santa Rosa	La Avellana
<i>canicularis</i>	AMNH474585	NA	Guatemala	NA	NA
<i>canicularis</i>	AMNH326011	F	Honduras	5 km S of Sabana Grande, Tegucigalpa	Piedra de Jesus
<i>clarae</i>	AMNH474575	F	Mexico	Guerrero	Acapulco
<i>eburnirostrum</i>	AMNH44704	M	Mexico	Oaxaca	Chihuitan, Tehuantepec
<i>canicularis</i>	AMNH326010	M	Honduras	5 km S of Sabana Grande, Tegucigalpa	Piedra de Jesus
<i>canicularis</i>	AMNH393734	M	Guatemala		Ocos
<i>eburnirostrum</i>	AMNH776273	M	Mexico	Oaxaca, 8 mi NW Tapanatepec	Rancho Sol y Luna
<i>canicularis</i>	AMNH393727	F	Guatemala		Progreso
<i>eburnirostrum</i>	USNM189129	M	Mexico		Acapulco
<i>canicularis</i>	USNM192764	M	Costa Rica		La Sabana
<i>canicularis</i>	USNM361458	M	Costa Rica		Liberia
<i>eburnirostrum</i>	USNM54212	NA	Mexico	Oaxaca	Tehuantepec
<i>canicularis</i>	USNM349537	F	Guatemala		Alotenango
<i>canicularis</i>	USNM361459	F	Costa Rica		Liberia
<i>canicularis</i>	USNM361461	F	Costa Rica		Liberia
<i>clarae</i>	USNM155375	M	Mexico	Colima	Manzanillo
<i>canicularis</i>	USNM89997	M	Guatemala		Naranjo
<i>canicularis</i>	USNM29413	NA	El Salvador		La Union
<i>eburnirostrum</i>	LSUMZ166806	F	Mexico	Oaxaca	Tapanatepec, 8 km N by road
<i>eburnirostrum</i>	LSUMZ166806	M	Mexico	Oaxaca	Tapanatepec, 8 km N by road
<i>eburnirostrum</i>	LSUMZ39666	F	Mexico	Oaxaca	Rancho, Santa Efigenia, 12 mi NW of Tapanatepec
<i>canicularis</i>	BMNH1949.58.139	M	Costa Rica		Miravalles
<i>canicularis</i>	BMNH1969.25.774	M	Costa Rica		Bagaces
<i>canicularis</i>	BMNH1969.25.775	M	Costa Rica		Miravalles
<i>canicularis</i>	BMNH96.12.1.117	M	El Salvador		La Libertad
<i>canicularis</i>	BMNH59.11.22.55	NA	Nicaragua		NA
<i>canicularis</i>	BMNH96.12.1.115	F	Guatemala		Retalhuleu
<i>canicularis</i>	BMNH96.12.1.114	F	Mexico	Chiapas	Tonala
<i>eburnirostrum</i>	BMNH89.1.30.106	M	Mexico	Oaxaca	Tehuantepec, Cacoprieto
<i>eburnirostrum</i>	LSUMZ27410	F	Mexico	Oaxaca	11 mi N Pochutla, 900 ft
<i>eburnirostrum</i>	LSUMZ43749	M	Mexico	Oaxaca	Rancho, Santa Efigenia, 12 mi NW of Tapanatepec

<i>eburnirostrum</i>	LSUMZ27412	F	Mexico	Oaxaca	11 mi N Pochutla, 900 ft
<i>eburnirostrum</i>	LSUMZ43751	F	Mexico	Oaxaca	Punto Paloma, Mar Muerto
<i>eburnirostrum</i>	LSUMZ43752	M	Mexico	Oaxaca	10 mi S of Matias Romero
<i>eburnirostrum</i>	LSUMZ33042	M	Mexico	Oaxaca	9 mi E Tapanatepec
<i>eburnirostrum</i>	LSUMZ24300	M	Mexico	Oaxaca	3 mi E Tapanatepec
<i>major</i>	AMNH149401	M	Paraguay	Rio Paraguay	Puerto Pinasco
<i>aurea</i>	AMNH44698	NA	Brazil	Bahia	NA
<i>aurea</i>	AMNH474563	M	Brazil	Bahia	NA
<i>major</i>	AMNH474542	F	Bolivia	Sara	Campos, 750 m
<i>aurea</i>	AMNH474564	M	Brazil	Bahia	NA
<i>aurea</i>	AMNH474556	M	Brazil	Bahia	Rio Preto
<i>aurea</i>	AMNH474565	NA	Brazil	Bahia	NA
<i>major</i>	AMNH474538	M	Bolivia	Sara	Province of Sara
<i>major</i>	AMNH474537	M	Bolivia	Sara	Province of Sara
<i>major</i>	FMNH295976	M	Bolivia	Santa Cruz	Santiagoma, 600 m
<i>major</i>	FMNH295977	F	Bolivia	Santa Cruz	Santiagoma, 600 m
<i>major</i>	FMNH295975	M	Bolivia	Santa Cruz	Santiagoma, 700 m
<i>major</i>	FMNH179098	F	Bolivia	Santa Cruz	Cercado
<i>aurea</i>	FMNH8481	M	Brazil	Pará	Santarem
<i>aurea</i>	FMNH8482	F	Brazil	Pará	Santarem
<i>aurea</i>	FMNH62921	M	Brazil	Piauí	Deserto
<i>aurea</i>	FMNH62926	F	Brazil	Maranhão	Tranqueira
<i>aurea</i>	FMNH62925	F	Brazil	Maranhão	Alto Parnaiba
<i>aurea</i>	FMNH62928	M	Brazil	Maranhão	Codo. Cocos
<i>aurea</i>	FMNH62924	F	Brazil	Maranhão	Grajahu
<i>aurea</i>	FMNH62929	M	Brazil	Maranhão	Codo. Cocos
<i>aurea</i>	FMNH62927	M	Brazil	Maranhão	Codo. Cocos
<i>aurea</i>	FMNH46991	M	Brazil	Bahia	São Marcelo
<i>aurea</i>	USNM36679	NA	Brazil	Pará	NA
<i>aurea</i>	USNM121055	M	Brazil	Minas Gerais	Diamantina
<i>aurea</i>	USNM368159	F	Brazil	Espirito Santo	Colatina
<i>aurea</i>	USNM333550	F	captivity	NA	Natural Zoological Park
<i>aurea</i>	USNM312988	F	captivity	NA	Natural Zoological Park
<i>aurea</i>	USNM145659	F	Brazil	NA	NA
<i>aurea</i>	USNM515993	F	Brazil	Goiás	Aragarças
<i>aurea</i>	USNM515996	M	Brazil	Goiás	Araguatins
<i>aurea</i>	USNM515995	M	Brazil	Brasilia	Brasilia
<i>aurea</i>	USNM514689	F	Brazil	Amapa	Porto Platon
<i>aurea</i>	USNM514688	F	Brazil	Amapa	Porto Platon
<i>aurea</i>	USNM515994	M	Brazil	Goiás	Aragarças
<i>aurea</i>	USNM368160	M	Brazil	Espirito Santo	Colatina
<i>aurea</i>	USNM145660	M	Brazil	NA	NA
<i>aurea</i>	USNM276912	M	Brazil	Pará	Santarém
<i>major</i>	AMNH127344	F	Brazil	Mato Grosso	Palmiras, Rio Taquary
<i>major</i>	AMNH127346	M	Brazil	Mato Grosso	Palmiras, Rio Taquary
<i>aurea</i>	AMNH127343	M	Brazil	Mato Grosso	José Bonifacio

<i>major</i>	AMNH319664	F	Paraguay		Rio Ipané
<i>major</i>	AMNH321806	M	Brazil	Mato Grosso	Campanario, Faz. São Francisco
<i>major</i>	AMNH321808	F	Brazil	Mato Grosso	Campanario, Faz. São Francisco
<i>aurea</i>	AMNH241709	NA	Brazil	Maranhão	São Luis, 90 km up Terezinha
<i>aurea</i>	AMNH241718	F	Brazil	Maranhão	As Manguieras (Flores)
<i>aurea</i>	AMNH241710	F	Brazil	Maranhão	São Luis, 90 km up Terezinha
<i>aurea</i>	AMNH241717	M	Brazil	Maranhão	As Manguieras (Flores)
<i>aurea</i>	MZUSP3412	F	Brazil	Pará	Santarém
<i>aurea</i>	3MZUSP413	M	Brazil	Pará	Santarém
<i>aurea</i>	MZUSP32061	M	Brazil	Pará	R. Tapajós (Leste), Santarém
<i>aurea</i>	MZUSP38459	M	Brazil	Pará	Cachimbo
<i>aurea</i>	MZUSP38460	F	Brazil	Pará	Cachimbo
<i>aurea</i>	MZUSP38697	F	Brazil	Pará	Cachimbo
<i>aurea</i>	MZUSP38698	F	Brazil	Pará	Cachimbo
<i>aurea</i>	MZUSP81993	NA	Brazil	Pará	Faz. Fartura, Santana do Araguaia
<i>aurea</i>	MZUSP88052	NA	Brazil	Pará	Fazenda Fartura, Sanatana do Araguaia
<i>aurea</i>	MZUSP89885	NA	Brazil	Pará	Fazenda Fartura, Sanatana do Araguaia
<i>aurea</i>	MZUSP52366	NA	Brazil	Tocantins	Araguatins
<i>aurea</i>	MZUSP79521	NA	Brazil	Tocantins	Mata do rio Galhão, Mateiros
<i>aurea</i>	MZUSP79522	NA	Brazil	Tocantins	Mata do rio Galhão, Mateiros
<i>aurea</i>	MZUSP79523	M	Brazil	Tocantins	Mata do rio Galhão, Mateiros
<i>aurea</i>	MZUSP79524	F	Brazil	Tocantins	Mata do rio Galhão, Mateiros
<i>aurea</i>	MZUSP79525	M	Brazil	Tocantins	ESEC Serra Geral do Tocantins
<i>aurea</i>	MZUSP79526	F	Brazil	Tocantins	ESEC Serra Geral do Tocantins
<i>aurea</i>	MZUSP79527	M	Brazil	Tocantins	ESEC Serra Geral do Tocantins
<i>aurea</i>	MZUSP6643	M	Brazil	Maranhão	Primeira Cruz
<i>aurea</i>	MZUSP38133	M	Brazil	Maranhão	Aldeia do Ponto
<i>aurea</i>	MZUSP42919	F	Brazil	Maranhão	Aldeia do Ponto
<i>aurea</i>	MZUSP42920	F	Brazil	Maranhão	Aldeia do Ponto
<i>aurea</i>	MZUSP42921	NA	Brazil	Maranhão	Aldeia do Ponto
<i>aurea</i>	MZUSP75217	NA	Brazil	Piauí	E. E. Urucui-Una, Bom Jesus
<i>aurea</i>	MZUSP75218	NA	Brazil	Piauí	E. E. Urucui-Una, Bom Jesus
<i>aurea</i>	MZUSP75219	NA	Brazil	Piauí	Faz. Emaflor, Bom Jesus
<i>aurea</i>	MZUSP41507	M	Brazil	Ceará	Icarai, Mosquito
<i>aurea</i>	MZUSP41508	M	Brazil	Ceará	Icarai, Mosquito
<i>aurea</i>	MZUSP39548	M	Brazil	Paraíba	R. Tinto, Uruba
<i>aurea</i>	MZUSP39549	M	Brazil	Paraíba	Mamanguape, Camaratuba
<i>aurea</i>	MZUSP39550	F	Brazil	Paraíba	Mamanguape, Camaratuba
<i>aurea</i>	MZUSP39551	F	Brazil	Paraíba	Mamanguape, Camaratuba
<i>aurea</i>	MZUSP39552	F	Brazil	Paraíba	Mamanguape, Camaratuba
<i>aurea</i>	MZUSP39553	NA	Brazil	Paraíba	Mamanguape, Camaratuba
<i>aurea</i>	MZUSP2269	NA	Brazil	Bahia	NA
<i>aurea</i>	MZUSP13991	M	Brazil	Bahia	Curupeba, próximo a Ilha

					Madre Deus
<i>aurea</i>	MZUSP13992	M	Brazil	Bahia	Curupeba, próximo a Ilha Madre Deus
<i>aurea</i>	MZUSP13993	M	Brazil	Bahia	Ilha de Madre Deus
<i>aurea</i>	MZUSP33035	M	Brazil	Bahia	Ilheús
<i>aurea</i>	MZUSP40832	M	Brazil	Bahia	Buritirama, Mun. de Barra
<i>aurea</i>	MZUSP40833	F	Brazil	Bahia	Buritirama, Mun. de Barra
<i>aurea</i>	MZUSP40834	M	Brazil	Bahia	Santa Rita de Cassia, Rio Preto
<i>aurea</i>	MZUSP40835	F	Brazil	Bahia	Santa Rita de Cassia, Rio Preto
<i>aurea</i>	MZUSP40836	F	Brazil	Bahia	Santa Rita de Cassia, Rio Preto
<i>aurea</i>	MZUSP40837	F	Brazil	Bahia	Santa Rita de Cassia, Rio Preto
<i>aurea</i>	MZUSP40838	F	Brazil	Bahia	Santa Rita de Cassia, Rio Preto
<i>aurea</i>	MZUSP14893	M	Brazil	Goiás	Jaraguá, Rio das Almas
<i>aurea</i>	MZUSP14894	F	Brazil	Goiás	Faz. Man. Peixoto, Rio das Almas
<i>aurea</i>	MZUSP15754	M	Brazil	Goiás	Barra do Rio São Domingos
<i>aurea</i>	MZUSP15755	M	Brazil	Goiás	Barra do Rio São Domingos
<i>aurea</i>	MZUSP26709	M	Brazil	Goiás	Faz. Transvaal, Municipio de Rio Verde
<i>aurea</i>	MZUSP26710	M	Brazil	Goiás	Faz. Transvaal, Municipio de Rio Verde
<i>aurea</i>	MZUSP38044	F	Brazil	Goiás	Faz. Sta. Adelia, Jataí
<i>aurea</i>	MZUSP38045	M	Brazil	Goiás	Faz. Sta. Adelia, Jataí
<i>aurea</i>	MZUSP72256	NA	Brazil	Goiás	Alexania
<i>aurea</i>	MZUSP72257	M	Brazil	Goiás	Goianira
<i>aurea</i>	MZUSP72258	NA	Brazil	Goiás	Alexania
<i>aurea</i>	MZUSP72259	NA	Brazil	Goiás	Itaberaí
<i>aurea</i>	MZUSP72260	M	Brazil	Goiás	Goianira
<i>aurea</i>	MZUSP74214	F	Brazil	Goiás	R. Tocantins (margem esquerda), Campinaçu
<i>aurea</i>	MZUSP74609	M	Brazil	Goiás	Nerópolis
<i>aurea</i>	MZUSP74610	M	Brazil	Goiás	Caldas Novas
<i>aurea</i>	MZUSP74611	F	Brazil	Goiás	Caldas Novas
<i>aurea</i>	MZUSP74612	F	Brazil	Goiás	Bela Vista
<i>aurea</i>	MZUSP74613	M	Brazil	Goiás	Bela Vista
<i>aurea</i>	MZUSP74614	M	Brazil	Goiás	Hidrolândia
<i>aurea</i>	MZUSP74615	F	Brazil	Goiás	Varjão
<i>aurea</i>	MZUSP74616	F	Brazil	Goiás	Caldas Novas
<i>aurea</i>	MZUSP74617	F	Brazil	Goiás	Nerópolis
<i>aurea</i>	MZUSP74738	F	Brazil	Goiás	Lagoa Formosa, Cabeceiras
<i>aurea</i>	MZUSP94570	NA	Brazil	Goiás	Campinaçu
<i>aurea</i>	MZUSP51816	M	Brazil	Distrito Federal	Planaltina
<i>aurea</i>	MZUSP51817	M	Brazil	Distrito Federal	Planaltina
<i>aurea</i>	MZUSP52365	M	Brazil	Distrito Federal	Planaltina
<i>aurea</i>	MZUSP9914	M	Brazil	Mato Grosso	São Luís de Cáceres
<i>aurea</i>	MZUSP9941	NA	Brazil	Mato Grosso	São Luís de Cáceres
<i>aurea</i>	MZUSP30146	M	Brazil	Mato Grosso	Faz. Aricá, Rio Aricá
<i>aurea</i>	MZUSP30147	F	Brazil	Mato Grosso	Cuiabá

<i>aurea</i>	MZUSP30148	F	Brazil	Mato Grosso	Cuiabá
<i>aurea</i>	MZUSP30149	M	Brazil	Mato Grosso	Cuiabá
<i>aurea</i>	MZUSP30150	F	Brazil	Mato Grosso	Faz. Aricá, Rio Aricá
<i>aurea</i>	MZUSP32299	F	Brazil	Mato Grosso	Chavantina, Rio das Mortes
<i>aurea</i>	MZUSP32300	M	Brazil	Mato Grosso	Chavantina, Rio das Mortes
<i>aurea</i>	MZUSP35015	M	Brazil	Mato Grosso	Dumbá
<i>aurea</i>	MZUSP35016	F	Brazil	Mato Grosso	Dumbá
<i>aurea</i>	MZUSP35017	F	Brazil	Mato Grosso	São Domingos, Rio das Mortes
<i>aurea</i>	MZUSP75876	M	Brazil	Mato Grosso	Alto do Garças
<i>aurea</i>	MZUSP88837	NA	Brazil	Mato Grosso	Jangada
<i>aurea</i>	MZUSP12227	NA	Brazil	Mato Grosso do Sul	Faz. Monte Verde, Coxim
<i>aurea</i>	MZUSP12689	M	Brazil	Mato Grosso do Sul	Jupia, Barranca do Rio Parana Sul
<i>aurea</i>	MZUSP12690	M	Brazil	Mato Grosso do Sul	Jupia, Barranca do Rio Parana Sul
<i>aurea</i>	MZUSP12691	M	Brazil	Mato Grosso do Sul	Jupia, Barranca do Rio Parana Sul
<i>aurea</i>	MZUSP12692	F	Brazil	Mato Grosso do Sul	Jupia, Barranca do Rio Parana Sul
<i>major</i>	MZUSP18283	F	Brazil	Mato Grosso do Sul	Salobra
<i>major</i>	MZUSP18284	F	Brazil	Mato Grosso do Sul	Salobra
<i>major</i>	MZUSP18285	F	Brazil	Mato Grosso do Sul	Salobra
<i>major</i>	MZUSP29058	F	Brazil	Mato Grosso do Sul	Salobra
<i>aurea</i>	MZUSP64147	M	Brazil	Mato Grosso do Sul	R. Sucuriu (margem esquerda), Três Lagoas
<i>aurea</i>	MZUSP64148	M	Brazil	Mato Grosso do Sul	R. Sucuriu (margem esquerda), Três Lagoas
<i>aurea</i>	MZUSP64149	F	Brazil	Mato Grosso do Sul	R. Sucuriu (margem esquerda), Três Lagoas
<i>aurea</i>	MZUSP64150	M	Brazil	Mato Grosso do Sul	R. Sucuriu (margem direita), Três Lagoas
<i>aurea</i>	MZUSP64151	F	Brazil	Mato Grosso do Sul	R. Sucuriu (margem esquerda), Três Lagoas
<i>aurea</i>	MZUSP64152	NA	Brazil	Mato Grosso do Sul	R. Sucuriu (margem esquerda), Três Lagoas
<i>aurea</i>	MZUSP64153	M	Brazil	Mato Grosso do Sul	R. Sucuriu (margem esquerda), Três Lagoas
<i>aurea</i>	MZUSP64154	F	Brazil	Mato Grosso do Sul	R. Sucuriu (margem esquerda), Três Lagoas
<i>aurea</i>	MZUSP64155	F	Brazil	Mato Grosso do Sul	R. Sucuriu (margem esquerda), Três Lagoas
<i>aurea</i>	MZUSP64156	M	Brazil	Mato Grosso do Sul	R. Sucuriu (margem esquerda), Três Lagoas
<i>aurea</i>	MZUSP64157	M	Brazil	Mato Grosso do Sul	R. Sucuriu (margem esquerda), Três Lagoas
<i>aurea</i>	MZUSP64158	F	Brazil	Mato Grosso do Sul	R. Sucuriu (margem esquerda), Três Lagoas
<i>aurea</i>	MZUSP64159	NA	Brazil	Mato Grosso do Sul	R. Sucuriu (margem direita), Três Lagoas

<i>aurea</i>	MZUSP74378	F	Brazil	Mato Grosso do Sul	R. Sucuriu (margem direita), Três Lagoas
<i>aurea</i>	MZUSP74379	F	Brazil	Mato Grosso do Sul	R. Sucuriu (margem esquerda), Três Lagoas
<i>aurea</i>	MZUSP74380	F	Brazil	Mato Grosso do Sul	R. Sucuriu (margem esquerda), Três Lagoas
<i>aurea</i>	MZUSP74381	F	Brazil	Mato Grosso do Sul	R. Sucuiu (margem direita), Três Lagoas - Retiro da Telha
<i>aurea</i>	MZUSP74382	M	Brazil	Mato Grosso do Sul	R. Sucuriu (margem direita), Três Lagoas
<i>aurea</i>	MZUSP15756	M	Brazil	Minas Gerais	R. Bandeiro
<i>aurea</i>	MZUSP61343	F	Brazil	Minas Gerais	Serra Itatiaiaçu
<i>aurea</i>	MZUSP61522	M	Brazil	Minas Gerais	Curvelo
<i>aurea</i>	MZUSP61523	M	Brazil	Minas Gerais	Curvelo
<i>aurea</i>	MZUSP61524	F	Brazil	Minas Gerais	Curvelo
<i>aurea</i>	MZUSP74736	M	Brazil	Minas Gerais	Cabeceiras
<i>aurea</i>	MZUSP74737	M	Brazil	Minas Gerais	Cabeceiras
<i>aurea</i>	MZUSP74739	F	Brazil	Minas Gerais	Cabeceiras
<i>aurea</i>	MZUSP78968	M	Brazil	Minas Gerais	Curvelo
<i>aurea</i>	MZUSP84344	F	Brazil	Minas Gerais	R. Bandeiro
<i>aurea</i>	MZUSP33034	M	Brazil	Espírito Santo	Mun. Colatina, Linhares
<i>aurea</i>	MZUSP4272	F	Brazil	São Paulo	Franca, Crystaes
<i>aurea</i>	MZUSP4489	F	Brazil	São Paulo	São Jerônimo, Avanhandava
<i>aurea</i>	MZUSP5557	F	Brazil	São Paulo	Bauru
<i>aurea</i>	MZUSP23790	F	Brazil	São Paulo	Faz. Ponte Nova, Macaúbas
<i>aurea</i>	MZUSP26711	NA	Brazil	São Paulo	Faz. Varjão, Lins
<i>aurea</i>	MZUSP26712	F	Brazil	São Paulo	Faz. Varjão, Lins
<i>aurea</i>	MZUSP26713	F	Brazil	São Paulo	Faz. Varjão, Lins
<i>aurea</i>	MZUSP51295	F	Brazil	São Paulo	Pedregulho, norte extremo de SP
<i>aurea</i>	MZUSP51296	NA	Brazil	São Paulo	Pedregulho, norte extremo de SP
<i>aurea</i>	MZUSP36746	M	Brazil	Paraná	R. Paracáí
<i>aurea</i>	LSUMZ28807	M	Brazil	Goiás	Ilha do Bananal, Macauba
<i>major</i>	LSUMZ84335	F	Peru	Madre de Dios	Pampas de Heath, ca 50 river km S Puerto Pardo
<i>major</i>	LSUMZ84337	F	Peru	Madre de Dios	Pampas de Heath, ca 50 river km S Puerto Pardo
<i>major</i>	LSUMZ123512	F	Bolivia	Benij	General Ballivian, 3 km SW San Borja, 450 m
<i>major</i>	LSUMZ35774	M	Bolivia	Santa Cruz	Buena Vista, Ichilo
<i>major</i>	LSUMZ37256	NA	Bolivia	Santa Cruz	Buena Vista, Ichilo
<i>major</i>	LSUMZ168735	F	Bolivia	Santa Cruz	Santa Fe, 138 km SW San Matias
<i>major</i>	LSUMZ168736	M	Bolivia	Santa Cruz	Estancia Camburas 38 km SSW San Matias
<i>major</i>	LSUMZ168737	M	Bolivia	Santa Cruz	Camburas 38 km SSW San Matias
<i>major</i>	LSUMZ168739	M	Bolivia	Santa Cruz	Camburas 38 km SSW San Matias
<i>major</i>	LSUMZ168738	F	Bolivia	Santa Cruz	Camburas 38 km SSW San

					Matias
<i>aurea</i>	BMNH09.1.30.99	NA	Brazil	Bahia	NA
<i>aurea</i>	BMNH90.6.1.54	NA	Brazil	NA	NA
<i>aurea</i>	BMNH90.6.1.55	NA		Pará	Mexiana Ilha
<i>aurea</i>	BMNH1906.12.21.190	M	Brazil	Bahia	Itaparica Ilha
<i>aurea</i>	BMNH1939.12.9.2923	F	captivity	SE Brazil	London
<i>aurea</i>	BMNH89.1.30.97	NA	Brazil	Bahia	NA
<i>aurea</i>	BMNH90.6.1.53	NA	Brazil	Bahia	NA
<i>aurea</i>	BMNH89.1.30.98	NA	Brazil	Bahia	NA
<i>aurea</i>	BMNH89.1.30.101	M	Brazil		Rio Paraná
<i>aurea</i>	BMNH89.1.10.497	F	Brazil	Mato Grosso	Chapada
<i>aurea</i>	MHNM433	M	Brazil	Goiás	Itaberaí
<i>aurea</i>	MNHN434	F	Brazil	Goiás	Itaberaí
<i>aurea</i>	MNHN432	M	Brazil	Goiás	Goianira
<i>aurea</i>	MNHN445	M	Brazil	Distrito Federal	Brasilia
<i>aurea</i>	MNHN472	F	Brazil	Goiás	Goiania
<i>aurea</i>	MNHN473	F	Brazil	Goiás	Goiania
<i>perpallida</i>	FMNH46988	M	Brazil	Ceará	Jua',nr. Iguato
<i>cactorum</i>	AMNH6220	M	Brazil	NA	NA
<i>flaviventris</i>	ZSMB17a	NA	Brazil	Bahia	Contendas, Juazeiro
<i>caixana</i>	ZSMB18	NA	Brazil	NA	NA
<i>flaviventris</i>	ZSMB17	NA	Brazil	Bahia	Contendas, Juazeiro
<i>caixana</i>	MZUSP77650	F	Brazil	Piauí	Lagoa do Jacu/PN Serra das Confusões
<i>caixana</i>	MZUSP77651	F	Brazil	Piauí	Parque Nacional da Serra das Confusões
<i>caixana</i>	MZUSP77652	M	Brazil	Piauí	Parque Nacional da Serra das Confusões
<i>caixana</i>	MZUSP77653	F	Brazil	Piauí	Parque Nacional da Serra das Confusões
<i>caixana</i>	MZUSP41501	M	Brazil	Ceará	Baturité, Açudinho
<i>caixana</i>	MZUSP41502	M	Brazil	Ceará	Baturité, Açudinho
<i>caixana</i>	MZUSP41503	M	Brazil	Ceará	Icarai, Mosquito
<i>caixana</i>	MZUSP41504	M	Brazil	Ceará	Icarai, Mosquito
<i>caixana</i>	MZUSP41505	F	Brazil	Ceará	Icarai, Mosquito
<i>caixana</i>	MZUSP41506	F	Brazil	Ceará	Icarai, Mosquito
<i>caixana</i>	MZUSP39529	M	Brazil	Paraíba	Coremas
<i>caixana</i>	MZUSP39530	M	Brazil	Paraíba	Coremas
<i>caixana</i>	MZUSP39531	M	Brazil	Paraíba	Coremas
<i>caixana</i>	MZUSP39532	M	Brazil	Paraíba	Coremas
<i>caixana</i>	MZUSP39533	M	Brazil	Paraíba	Coremas
<i>caixana</i>	MZUSP39534	M	Brazil	Paraíba	Coremas
<i>caixana</i>	MZUSP39535	M	Brazil	Paraíba	Coremas
<i>caixana</i>	MZUSP39536	M	Brazil	Paraíba	Coremas
<i>caixana</i>	MZUSP39537	M	Brazil	Paraíba	Coremas
<i>caixana</i>	MZUSP39538	M	Brazil	Paraíba	Coremas
<i>caixana</i>	MZUSP39539	M	Brazil	Paraíba	Coremas

<i>caixana</i>	MZUSP39540	M	Brazil	Paraíba	Coremas
<i>caixana</i>	MZUSP39541	M	Brazil	Paraíba	Coremas
<i>caixana</i>	MZUSP39542	F	Brazil	Paraíba	Coremas
<i>caixana</i>	MZUSP39543	NA	Brazil	Paraíba	Coremas
<i>caixana</i>	MZUSP39544	F	Brazil	Paraíba	Coremas
<i>caixana</i>	MZUSP39545	F	Brazil	Paraíba	Coremas
<i>caixana</i>	MZUSP39546	F	Brazil	Paraíba	Coremas
<i>caixana</i>	MZUSP39547	F	Brazil	Paraíba	Coremas
<i>caixana</i>	MZUSP63619	M	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>caixana</i>	MZUSP63620	F	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>caixana</i>	MZUSP63621	M	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>caixana</i>	MZUSP63622	F	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>caixana</i>	MZUSP63623	M	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>caixana</i>	MZUSP63624	M	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>caixana</i>	MZUSP63625	F	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>caixana</i>	MZUSP63626	M	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>caixana</i>	MZUSP63627	F	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>caixana</i>	MZUSP63628	NA	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>caixana</i>	MZUSP63629	NA	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>caixana</i>	MZUSP63630	M	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>caixana</i>	MZUSP63631	NA	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>caixana</i>	MZUSP63632	F	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>caixana</i>	MZUSP63633	F	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>caixana</i>	MZUSP63634	M	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>caixana</i>	MZUSP7328	M	Brazil	Bahia	Juazeiro
<i>caixana</i>	MZUSP7329	M	Brazil	Bahia	Juazeiro
<i>cactorum</i>	MZUSP7331	M	Brazil	Bahia	Vila Nova
<i>cactorum</i>	MZUSP40839	M	Brazil	Bahia	Buritirama, Mun. de Barra
<i>cactorum</i>	MZUSP40840	M	Brazil	Bahia	Buritirama, Mun. de Barra
<i>cactorum</i>	MZUSP40841	F	Brazil	Bahia	Buritirama, Mun. de Barra
<i>cactorum</i>	MZUSP40842	F	Brazil	Bahia	Buritirama, Mun. de Barra
<i>caixana</i>	MZUSP61526	M	Brazil	Bahia	Itaberaba
<i>cactorum</i>	MZUSP8354	M	Brazil	Minas Gerais	Pirapora
<i>cactorum</i>	MZUSP15762	F	Brazil	Minas Gerais	R. Bandeiro
<i>cactorum</i>	FMNH46989	M	Brazil	Bahia	Queimadas
<i>cactorum</i>	FMNH191626	M	Brazil	Minas Gerais	Janauba

<i>cactorum</i>	FMNH46990	M	Brazil	Bahia	Queimadas
<i>cactorum</i>	FMNH191627	M	Brazil	Minas Gerais	Janauba
<i>cactorum</i>	FMNH191628	F	Brazil	Minas Gerais	Janauba
<i>cactorum</i>	FMNH344304	F	Brazil	Minas Gerais	Arimos
<i>cactorum</i>	MZUSP82707	NA	Brazil	Minas Gerais	Itacarambi, Volta da Serra
<i>cactorum</i>	MZUSP82844	NA	Brazil	Minas Gerais	Coração de Jesus
<i>cactorum</i>	MZUSP82845	NA	Brazil	Minas Gerais	Coração de Jesus
<i>cactorum</i>	MZUSP82846	NA	Brazil	Minas Gerais	Coração de Jesus
<i>cactorum</i>	MZUSP82847	NA	Brazil	Minas Gerais	Coração de Jesus
<i>cactorum</i>	MZUSP82848	NA	Brazil	Minas Gerais	Coração de Jesus
<i>cactorum</i>	MZUSP82874	F	Brazil	Minas Gerais	Coração de Jesus
<i>caixana</i>	MZUSP2112	NA	Brazil	NA	NA
<i>caixana</i>	AMNH241726	M	Brazil	Ceará, 1850 feet	Juazeiro, Serra Verde
<i>caixana</i>	AMNH241725	M	Brazil	Ceará, 800 feet	Lavras, São Domingos
<i>caixana</i>	AMNH241724	F	Brazil	Ceará, 900 feet	Lavras
<i>caixana</i>	AMNH241722	NA	Brazil	Pernambuco	Rio Branco, 2000 feet
<i>caixana</i>	AMNH241732	M	Brazil	Bahia	Barra, 1400 feet
<i>caixana</i>	AMNH241721	M	Brazil	Pernambuco	Rio Branco, 2000 feet
<i>caixana</i>	AMNH241720	F	Brazil	Piauí	Parnagua, 1000 feet
<i>cactorum</i>	AMNH241734	F	Brazil	Bahia	Barra, 1400 feet
<i>cactorum</i>	AMNH474496	F	Brazil	Bahia	Lamarão
<i>cactorum</i>	AMNH474493	M	Brazil	Bahia	Lamarão
<i>cactorum</i>	AMNH474494	M	Brazil	Bahia	Lamarão
<i>caixana</i>	AMNH174599	M	Brazil	Bahia	Catinga b.Fac. De Serra, Rio Grande
<i>cactorum</i>	AMNH6221	NA	Brazil	NA	NA
<i>cactorum</i>	AMNH241736	M	Brazil	Bahia	Morro do Chapéu, 3600 feet
<i>caixana</i>	AMNH139938	M	Brazil	Bahia	Juazeiro
<i>caixana</i>	AMNH241735	M	Brazil	Bahia	Barra, 1400 feet
<i>caixana</i>	AMNH241730	F	Brazil	Ceará, 1850 feet	Juazeiro, Serra Verde
<i>caixana</i>	AMNH241727	M	Brazil	Ceará, 1850 feet	Juazeiro, Serra Verde
<i>caixana</i>	AMNH241729	M	Brazil	Ceará, 1850 feet	Juazeiro, Serra Verde
<i>caixana</i>	AMNH241728	M	Brazil	Ceará, 1850 feet	Juazeiro, Serra Verde
<i>cactorum</i>	AMNH474497	M	Brazil	Bahia	Rio Preto
<i>cactorum</i>	AMNH474495	F	Brazil	Bahia	Lamarão
<i>cactorum</i>	AMNH241742	F	Brazil	Bahia	Tambury, 1100 feet
<i>cactorum</i>	AMNH241737	F	Brazil	Bahia	Morro do Chapéu, 3600 feet
<i>cactorum</i>	AMNH241741	M	Brazil	Bahia	Tambury, 1100 feet
<i>caixana</i>	AMNH241723	M	Brazil	Ceará, 900 feet	Lavras
<i>cactorum</i>	AMNH241738	F	Brazil	Bahia	Morro do Chapéu, 3600 feet
<i>cactorum</i>	AMNH241740	M	Brazil	Bahia	Tambury, 1100 feet
<i>cactorum</i>	AMNH241739	NA	Brazil	Bahia	Morro do Chapéu, 3600 feet
<i>cactorum</i>	AMNH241731	M	Brazil	Bahia	Santa Ritta, 1600 feet
<i>caixana</i>	AMNH241733	F	Brazil	Bahia	Barra, 1400 feet
<i>caixana</i>	USNM257357	F	NA	NA	NA
<i>caixana</i>	USNM257978	F	NA	NA	NA

<i>caixana</i>	USNM264610	M	Brazil	Ceará	Lavras
<i>caixana</i>	USNM264609	F	Brazil	Ceará, 900 feet	Lavras
<i>caixana</i>	USNM264608	F	Brazil	Ceará, 900 feet	Lavras
<i>caixana</i>	FMNH62865	F	Brazil	Piauí	Ibiapaba
<i>caixana</i>	FMNH62866	M	Brazil	Piauí	Ibiapaba
<i>caixana</i>	FMNH62863	F	Brazil	Piauí	Ibiapaba
<i>caixana</i>	FMNH62864	M	Brazil	Piauí	Ibiapaba
<i>caixana</i>	FMNH62862	F	Brazil	Piauí	Ibiapaba
<i>caixana</i>	FMNH62861	F	Brazil	Piauí	Ibiapaba
<i>cactorum</i>	BMNH91.1.23.34	NA	captivity		London
<i>cactorum</i>	BMNH1903.12.15.13	F	Brazil	Bahia	Lamarão
<i>cactorum</i>	BMNH91.1.23.35	NA	captivity		London
<i>cactorum</i>	BMNH89.1.30.126	NA	Brazil	Bahia	NA
<i>cactorum</i>	BMNH57.3.8.4	JUV	Brazil	Bahia	NA
<i>cactorum</i>	BMNH90.6.1.69	NA	Brazil	NA	NA
<i>cactorum</i>	BMNH90.4.1.25	F	captivity	NA	London
<i>cactorum</i>	BMNH89.1.30.125	NA	Brazil	Bahia	NA
<i>cactorum</i>	MNHN1492	NA	NA	NA	NA
<i>cactorum</i>	MNHN1554	F	Brazil	Bahia	Lamarão
<i>caixana</i>	MNHN796	NA	Brazil	Pernambuco	Exu
<i>cactorum</i>	MNHN462	NA	Brazil	Bahia	NA
<i>cactorum</i>	MNHN2003_2526	NA	Brazil	Bahia	NA
<i>pertinax</i>	AMNH163848	M	Virgin Islands		St. Thomas
<i>pertinax</i>	AMNH474437	M	Virgin Islands		St. Thomas
<i>pertinax</i>	AMNH174655	M	Lesser Antilles		Curaçao
<i>pertinax</i>	AMNH474438	F	Virgin Islands		St. Thomas
<i>pertinax</i>	LSUMZ142061	M	Virgin Islands		St. Thomas
<i>pertinax</i>	LSUMZ142062	M	Virgin Islands		St. Thomas
<i>pertinax</i>	LSUMZ22027	M	Lesser Antilles		Curacao
<i>pertinax</i>	AMNH163844	M	Lesser Antilles		St.Thomas
<i>pertinax</i>	AMNH163840	M	Lesser Antilles		St. Thomas
<i>pertinax</i>	AMNH163854	F	Lesser Antilles		St. Thomas
<i>pertinax</i>	AMNH163846	M	Lesser Antilles		St. Thomas
<i>pertinax</i>	AMNH163845	M	Lesser Antilles		St. Thomas
<i>pertinax</i>	AMNH163841	M	Lesser Antilles		St. Thomas
<i>pertinax</i>	AMNH163838	M	Lesser Antilles		St. Thomas
<i>pertinax</i>	AMNH163853	F	Lesser		St. Thomas

			Antilles		
<i>pertinax</i>	AMNH163842	M	Lesser Antilles		St. Thomas
<i>pertinax</i>	AMNH163849	M	Lesser Antilles		St. Thomas
<i>pertinax</i>	AMNH474435	F	Lesser Antilles	Curaçao	Savonet
<i>pertinax</i>	AMNH163850	F	Lesser Antilles		St. Thomas
<i>pertinax</i>	AMNH163839	M	Lesser Antilles		St. Thomas
<i>pertinax</i>	AMNH163837	M	Lesser Antilles		St. Thomas
<i>pertinax</i>	AMNH474434	M	Lesser Antilles		Curaçao
<i>pertinax</i>	AMNH163847	F	Lesser Antilles		St. Thomas
<i>pertinax</i>	AMNH163852	F	Lesser Antilles		St. Thomas
<i>pertinax</i>	AMNH163843	M	Lesser Antilles		St. Thomas
<i>pertinax</i>	AMNH163857	F	Lesser Antilles		St. Thomas
<i>pertinax</i>	AMNH474436	F	Lesser Antilles	Curaçao	Savonet
<i>pertinax</i>	USNM327967	M	captivity	NA	NA
<i>pertinax</i>	USNM81004	NA	Lesser Antilles		St. Thomas
<i>pertinax</i>	USNM17759	NA	NA	NA	NA
<i>pertinax</i>	USNM17760	NA	Lesser Antilles		St. Thomas
<i>pertinax</i>	USNM354362	F	Lesser Antilles		St. Thomas
<i>pertinax</i>	USNM354358	M	Lesser Antilles		St. Thomas
<i>pertinax</i>	USNM26947	NA	Lesser Antilles		St. Thomas
<i>pertinax</i>	FMNH38021	F	Lesser Antilles		Curacao
<i>pertinax</i>	FMNH110303	M	Lesser Antilles		St.Thomas
<i>pertinax</i>	FMNH110300	M	Lesser Antilles		St.Thomas
<i>pertinax</i>	FMNH38023	F	Lesser Antilles		Curacao
<i>pertinax</i>	FMNH110301	M	Lesser Antilles		St.Thomas
<i>pertinax</i>	FMNH40281	M	Lesser Antilles		St.Thomas
<i>pertinax</i>	FMNH38024	M	Lesser Antilles		Curacao
<i>pertinax</i>	FMNH38272	F	Lesser Antilles		Curacao
<i>pertinax</i>	BMNH1914.12.1.415	M	Lesser Antilles		St. Thomas
<i>pertinax</i>	BMNH91.4.1.26	M	Lesser		St. Thomas

			Antilles		
<i>pertinax</i>	BMNH1912.11.26.1	NA	Lesser Antilles		St. Thomas
<i>pertinax</i>	BMNH1914.12.1.417	M	Lesser Antilles		St. Thomas
<i>pertinax</i>	BMNH1859.10.11.1	NA	Lesser Antilles		St. Thomas
<i>xanthogenia</i>	AMNH474444	F	Lesser Antilles		Bonaire Island
<i>pertinax</i>	AMNH44708	NA	Lesser Antilles		St. Thomas
<i>xanthogenia</i>	AMNH474439	M	Lesser Antilles		Bonaire Island
<i>xanthogenia</i>	AMNH474443	M	Lesser Antilles		Bonaire Island
<i>xanthogenia</i>	AMNH47440	M	Lesser Antilles		Bonaire Island
<i>xanthogenia</i>	AMNH474442	M	Lesser Antilles		Bonaire Island
<i>xanthogenia</i>	AMNH174661	F	Lesser Antilles		Bonaire Island
<i>xanthogenia</i>	AMNH474445	F	Lesser Antilles	Bonaire Island	Rincon
<i>xanthogenia</i>	USNM153955	F	Lesser Antilles		Bonaire
<i>xanthogenia</i>	USNM208904	M	captivity		Natural Zoological Park
<i>xanthogenia</i>	USNM533661	F	Lesser Antilles		Bonaire
<i>xanthogenia</i>	USNM533663	F	Lesser Antilles		Bonaire
<i>xanthogenia</i>	USNM533660	M	Lesser Antilles		Bonaire
<i>xanthogenia</i>	USNM533664	M	Lesser Antilles		Bonaire
<i>xanthogenia</i>	USNM533659	F	Lesser Antilles		Bonaire
<i>xanthogenia</i>	USNM533662	M	Lesser Antilles		Bonaire
<i>xanthogenia</i>	FMNH38264	M	Lesser Antilles		Bonaire
<i>xanthogenia</i>	FMNH38266	F	Lesser Antilles		Bonaire
<i>xanthogenia</i>	FMNH38268	F	Lesser Antilles		Bonaire
<i>xanthogenia</i>	FMNH38265	F	Lesser Antilles		Bonaire
<i>xanthogenia</i>	FMNH38261	M	Lesser Antilles		Bonaire
<i>xanthogenia</i>	FMNH38271	M	Lesser Antilles		Bonaire
<i>xanthogenia</i>	FMNH38270	M	Lesser Antilles		Bonaire
<i>xanthogenia</i>	FMNH38262	F	Lesser Antilles		Bonaire
<i>paraensis</i>	AMNH802426	M	Brazil	Pará	Alto Tapajos
<i>paraensis</i>	MZUSP55719	M	Brazil	Pará	R. Cururu, Alto tapajos

					(margem direita)
<i>paraensis</i>	MNRJA28910	M	Brazil	Pará	Rio Cururu alto
<i>paraensis</i>	MNRJA28911	F	Brazil	Pará	Rio Cururu alto
<i>paraensis</i>	MNRJ30698	F	Brazil	Pará	Rio Cururu alto
<i>lehmanni</i>	AMNH460110	M	Colombia	Meta	Villavicencio
<i>lehmanni</i>	MZUSP43577	M	Colombia	Meta	Peralonso
<i>lehmanni</i>	MZUSP43578	M	Colombia	Meta	Peralonso
<i>lehmanni</i>	FMNH297429	M	Colombia	Meta	Carimagua
<i>lehmanni</i>	FMNH297428	M	Colombia	Meta	Carimagua
<i>lehmanni</i>	FMNH248529	M	Colombia	Meta	San Juan de Arama
<i>lehmanni</i>	FMNH248528	F	Colombia	Meta	San Juan de Arama
<i>lehmanni</i>	FMNH325419	F	captivity	NA	NA
<i>arubensis</i>	AMNH474446	M	Lesser Antilles		Aruba
<i>arubensis</i>	AMNH474447	F	Lesser Antilles		Aruba
<i>arubensis</i>	AMNH474448	M	Lesser Antilles		Aruba
<i>arubensis</i>	AMNH174660	F	Lesser Antilles		Aruba
<i>arubensis</i>	FMNH38119	F	Lesser Antilles		Aruba
<i>arubensis</i>	FMNH38115	F	Lesser Antilles		Aruba
<i>arubensis</i>	FMNH38117	F	Lesser Antilles		Aruba
<i>arubensis</i>	FMNH38120	M	Lesser Antilles		Aruba
<i>arubensis</i>	FMNH38116	M	Lesser Antilles		Aruba
<i>arubensis</i>	FMNH38121	M	Lesser Antilles		Aruba
<i>venezuelae</i>	AMNH474454	M	Venezuela	Orinoco	Altagracia
<i>venezuelae</i>	AMNH177098	F	Venezuela	Bolivar	Caicara
<i>venezuelae</i>	AMNH474475	M	Venezuela	St. of Cumana	Campos Alegre Valley
<i>venezuelae</i>	AMNH474476	NA	Venezuela		Cumana
<i>venezuelae</i>	AMNH73538	NA	Venezuela		Bermudez
<i>venezuelae</i>	AMNH150193	M	Venezuela	Falcon	Tucacas
<i>venezuelae</i>	AMNH474467	M	Venezuela	Orinoco river	Ciudad Bolivar
<i>venezuelae</i>	AMNH177099	M	Venezuela	Bolivar	Caicara
<i>venezuelae</i>	AMNH188159	F	Venezuela	Sucre	Cuchivano, 700 ft
<i>venezuelae</i>	AMNH177097	F	Venezuela	Orinoco river	Caicara
<i>venezuelae</i>	AMNH474463	M	Venezuela	Orinoco river	Maipures
<i>venezuelae</i>	AMNH150194	M	Venezuela	Estado Lara	El Cuji
<i>venezuelae</i>	AMNH437234	F	Venezuela	Bolivar	Caicara
<i>venezuelae</i>	AMNH76091	F	Venezuela	Bolivar	Suapure
<i>venezuelae</i>	AMNH150192	M	Venezuela	Estado Falcon	Tucacas
<i>venezuelae</i>	USNM389627	M	Venezuela	Aragua	El Limón
<i>venezuelae</i>	USNM88480	M	Venezuela	Puerto Cabello	San Esteban

<i>venezuelae</i>	USNM329503	M	Venezuela	Anzoategui	Soledad
<i>venezuelae</i>	USNM329504	M	Venezuela	Anzoategui	Soledad
<i>venezuelae</i>	USNM351884	M	Venezuela	Julian Mellado	El Sombrero
<i>venezuelae</i>	USNM354365	M	Venezuela	Aragua	Maracay
<i>venezuelae</i>	USNM316400	M	Venezuela	Anzoategui	Soledad
<i>aeruginosa</i>	USNM389626	M	Venezuela	Aragua	Pie del Serro
<i>venezuelae</i>	USNM533833	F	Venezuela	Trujillo	Agua Santa, 23 mi NW Valera
<i>venezuelae</i>	FMNH110299	F	Venezuela	Aragua	Maracay
<i>venezuelae</i>	FMNH91863	M	Venezuela	Sucre	Cocollar
<i>chrysophrys</i>	FMNH45053	M	Brazil	Amazonas	Boa Vista, Rio Branco
<i>venezuelae</i>	FMNH91865	F	Venezuela	Sucre	Cocollar
<i>venezuelae</i>	FMNH34496	F	Venezuela	Lake Valencia	Aragua
<i>venezuelae</i>	FMNH34495	F	Venezuela	Aragua	Maracay
<i>venezuelae</i>	FMNH91862	F	Venezuela	Sucre	Cocollar
<i>venezuelae</i>	FMNH34487	M	Venezuela	Aragua	Maracay
<i>venezuelae</i>	BMNH1904.5.29.61	F	Venezuela		Gulf of Cariaco
<i>venezuelae</i>	BMNH1904.5.29.62	M	Venezuela	Sucre	Laguna Grande del Obispo
<i>venezuelae</i>	BMNH1904.5.29.59	NA	Venezuela		Gulf of Cariaco
<i>venezuelae</i>	BMNH1904.5.29.63	NA	Venezuela		Gulf of Cariaco
<i>margaritensis</i>	FMNH39151	M	Venezuela	Nueva Esparta	Margarita Island
<i>margaritensis</i>	BMNH1904.5.29.91	NA	Venezuela	Nueva Esparta	Margarita Island
<i>margaritensis</i>	BMNH1914.12.1.418	M	Venezuela	Nueva Esparta	Margarita Island
<i>margaritensis</i>	BMNH1965.36.14	F	Venezuela	Calabozo	Estacion biologica de los Llanos
<i>margaritensis</i>	BMNH1904.5.29.90	NA	Venezuela	Nueva Esparta	Margarita Island
<i>margaritensis</i>	AMNH474451	F	Venezuela	Nueva Esparta	Margarita Island
<i>margaritensis</i>	AMNH174663	M	Venezuela	Nueva Esparta	Margarita Island
<i>margaritensis</i>	AMNH474453	NA	Venezuela	Nueva Esparta	Margarita Island
<i>margaritensis</i>	AMNH174662	M	Venezuela	Nueva Esparta	Margarita Island
<i>margaritensis</i>	AMNH474452	F	Venezuela	Nueva Esparta	Margarita Island
<i>margaritensis</i>	AMNH174665	F	Venezuela	Nueva Esparta	Margarita Island
<i>margaritensis</i>	AMNH474450	M	Venezuela	Nueva Esparta	Margarita Island
<i>margaritensis</i>	AMNH174664	F	Venezuela	Nueva Esparta	Margarita Island
<i>margaritensis</i>	USNM151665	M	Venezuela	Nueva Esparta	Margarita Island
<i>margaritensis</i>	USNM151666	F	Venezuela	Nueva Esparta	Margarita Island
<i>margaritensis</i>	USNM309513	M	Venezuela	Nueva Esparta	Margarita Island
<i>margaritensis</i>	USNM151664	M	Venezuela	Nueva Esparta	Margarita Island
<i>margaritensis</i>	FMNH39149	F	Venezuela	Nueva Esparta	Margarita Island
<i>margaritensis</i>	FMNH39154	M	Venezuela	Nueva Esparta	Margarita Island
<i>margaritensis</i>	FMNH39138	M	Venezuela	Nueva Esparta	Margarita Island
<i>margaritensis</i>	FMNH39139	F	Venezuela	Nueva Esparta	Margarita Island
<i>margaritensis</i>	FMNH39144	F	Venezuela	Nueva Esparta	Margarita Island
<i>margaritensis</i>	FMNH39156	F	Venezuela	Nueva Esparta	Margarita Island
<i>margaritensis</i>	FMNH39137	F	Venezuela	Nueva Esparta	Margarita Island
<i>margaritensis</i>	FMNH39142	M	Venezuela	Nueva Esparta	Margarita Island
<i>tortugensis</i>	FMNH36976	M	Venezuela	Tortuga island	

<i>tortugensis</i>	AMNH174657	F	Venezuela	Tortuga island	
<i>tortugensis</i>	AMNH174658	F	Venezuela	Tortuga island	
<i>tortugensis</i>	AMNH174656	M	Venezuela	Tortuga island	
<i>tortugensis</i>	AMNH174659	F	Venezuela	Tortuga island	
<i>tortugensis</i>	FMNH39111	M	Venezuela	Tortuga Island	
<i>tortugensis</i>	FMNH39113	NA	Venezuela	Tortuga Island	
<i>tortugensis</i>	FMNH39115	F	Venezuela	Tortuga Island	
<i>tortugensis</i>	FMNH39121	M	Venezuela	Tortuga Island	
<i>tortugensis</i>	FMNH39133	F	Venezuela	Tortuga Island	
<i>tortugensis</i>	FMNH39120	F	Venezuela	Tortuga Island	
<i>tortugensis</i>	FMNH39129	F	Venezuela	Tortuga Island	
<i>tortugensis</i>	FMNH39112	F	Venezuela	Tortuga Island	
<i>occidentalis</i>	CM44695	M	Colombia		Rio Hacha
<i>aeruginosa</i>	MZUSP13528	M	Colombia	Magdalena River	NA
<i>venezuelae</i>	MZUSP5674	M	Venezuela	Guanoco	NA
<i>aeruginosa</i>	AMNH133011	M	Colombia	lower Magdalena River	
<i>venezuelae</i>	AMNH474470	NA	Venezuela		San Carlos
<i>venezuelae</i>	AMNH474471	NA	Venezuela		San Carlos
<i>surinama</i>	AMNH48257	F	Suriname		Saramacca river
<i>aeruginosa</i>	AMNH133012	M	Colombia	Barranquilla	La Playa
<i>surinama</i>	AMNH48257	M	Suriname		Saramacca river
<i>aeruginosa</i>	AMNH474449	NA	NA	NA	NA
<i>aeruginosa</i>	AMNH121463	M	Colombia	Magdalena River	
<i>aeruginosa</i>	AMNH121460	NA	Colombia	Magdalena River	
<i>aeruginosa</i>	AMNH121461	M	Colombia	Magdalena River	
<i>aeruginosa</i>	AMNH133013	M	Colombia	Barranquilla	La Playa
<i>aeruginosa</i>	AMNH133015	F	Colombia	Barranquilla	La Playa
<i>aeruginosa</i>	AMNH44706	NA	NA	NA	NA
<i>aeruginosa</i>	AMNH121464	F	Colombia	Magdalena River	Calamar, 50 ft
<i>aeruginosa</i>	AMNH121465	M	Colombia	Magdalena River	Calamar, 50 ft
<i>aeruginosa</i>	USNM383480	M	Colombia	Magdalena	Distraccion
<i>aeruginosa</i>	USNM383481	F	Colombia	Magdalena	Distraccion
<i>aeruginosa</i>	USNM383479	M	Colombia	Sierra Nevada, Santa Marta	Atanguez
<i>aeruginosa</i>	USNM383475	F	Colombia	Magdalena	El Conejo
<i>aeruginosa</i>	USNM383476	F	Colombia	Sierra Nevada, Santa Marta	Atanguez
<i>aeruginosa</i>	USNM383478	M	Colombia	Sierra Nevada, Santa Marta	Atanguez
<i>aeruginosa</i>	USNM372600	M	Colombia	Magdalena	La Gloria, Puerto Sagoc
<i>aeruginosa</i>	USNM372599	F	Colombia	Magdalena	La Gloria, Puerto Sagoc
<i>aeruginosa</i>	USNM368669	M	Colombia		Puerto Estrella

<i>aeruginosa</i>	USNM368668	M	Colombia		Rioacha
<i>aeruginosa</i>	FMNH50920	F	Colombia	Barranquilla	La Playa
<i>aeruginosa</i>	FMNH72325	M	Colombia	Bolivar	Lorica
<i>aeruginosa</i>	FMNH72326	F	Colombia	Bolivar	Lorica
<i>aeruginosa</i>	FMNH190747	F	Colombia	Antioquia	Nechi
<i>aeruginosa</i>	FMNH43290	M	Venezuela	Zulia	Rio Aurara
<i>aeruginosa</i>	FMNH34490	M	Venezuela	Zulia	Encontrados
<i>aeruginosa</i>	FMNH34492	F	Venezuela	Zulia	Encontrados
<i>aeruginosa</i>	FMNH34489	M	Venezuela	Zulia	Encontrados
<i>aeruginosa</i>	BMNH89.1.30.111	NA	Colombia	Magdalena Valley	Cienaga
<i>surinama</i>	BMNH57.3.15.7	NA	Lesser Antilles		Trinidad
<i>chrysophrys</i>	MNHN433	F	Venezuela		Roraima
<i>chrysophrys</i>	MNHN432	M	Venezuela		Roraima
<i>surinama</i>	MNHN2003_2525	M	Lesser Antilles		Trinidad
<i>chrysophrys</i>	MNHN434	M	Venezuela		Roraima
<i>chrysophrys</i>	MNHN435	F	Venezuela		Roraima
<i>surinama</i>	MNHN437	M	Lesser Antilles		Trinidad
<i>ocularis</i>	BMNH1889.1.30.116	M	Panama		Isthmus of Panama
<i>ocularis</i>	AMNH77443	M	Panama	Chiriqui	Boqueron
<i>ocularis</i>	AMNH106353	F	Panama	Chiriqui	Boqueron
<i>ocularis</i>	AMNH233120	F	Panama	Mala Peninsula	Cerro Largo
<i>ocularis</i>	AMNH1066352	M	Panama	Chiriqui	Boqueron
<i>ocularis</i>	AMNH186682	F	Panama	Veraguas, 15 mi SE of Santiago	El Villano
<i>ocularis</i>	AMNH186684	M	Panama	Veraguas, 15 mi SE of Santiago	El Villano
<i>ocularis</i>	AMNH233121	M	Panama	Cape Mala Peninsula	Cerro Largo
<i>ocularis</i>	AMNH247135	F	Panama	Coclé	Aguadulce
<i>ocularis</i>	AMNH186683	F	Panama	Veraguas, 15 mi SE of Santiago	El Villano
<i>ocularis</i>	AMNH183064	F	Panama	Veraguas, Santiago	La Colorada
<i>ocularis</i>	AMNH233119	M	Panama	Cape Mala Peninsula	Cerro Largo
<i>ocularis</i>	AMNH474504	F	Panama		Brava Island
<i>ocularis</i>	AMNH44693	M	Panama	NA	NA
<i>ocularis</i>	AMNH183065	F	Panama	Veraguas, Santiago	La Colorada
<i>ocularis</i>	AMNH474510	M	Panama	NA	NA
<i>ocularis</i>	AMNH183063	F	Panama	Veraguas, Santiago	La Colorada
<i>ocularis</i>	AMNH474508	NA	Panama	Chiriqui	Boqueti
<i>ocularis</i>	AMNH247134	M	Panama	Coclé	Aguadulce
<i>ocularis</i>	AMNH44694	F	Panama	NA	NA
<i>ocularis</i>	AMNH474512	M	Panama	NA	NA

<i>ocularis</i>	AMNH474511	M	Panama	Coclé	Nata
<i>ocularis</i>	AMNH47444	F	Panama	Chiriqui	Boqueron
<i>ocularis</i>	USNM476642	M	Panama	Coclé	El Potrero
<i>ocularis</i>	USNM400247	M	Panama		Parita
<i>ocularis</i>	USNM188410	F	Panama		Divalá
<i>ocularis</i>	USNM400246	F	Panama		Parita
<i>ocularis</i>	USNM400248	F	Panama		Parita
<i>ocularis</i>	USNM188411	M	Panama		Divalá
<i>ocularis</i>	USNM461814	F	Panama	Pedasí	Los Santos
<i>ocularis</i>	USNM476643	F	Panama	Coclé	El Potrero
<i>ocularis</i>	USNM477607	F	Panama	Coclé	Aguadulce
<i>ocularis</i>	USNM532994	M	Panama	Porto Armurelles	Chiriquí
<i>ocularis</i>	LSUMZJTW550	M	Panama	Cocle	SW Anton between Rosario and Pacific ocean, 40 m
<i>ocularis</i>	FMNH19639	F	Panama	Chiriqui	Boqueron
<i>ocularis</i>	FMNH355159	F	Panama	NA	NA
<i>ocularis</i>	FMNH355160	M	captivity	Kansas	Busch Gardens
<i>ocularis</i>	FMNH40319	NA	Panama	Cocle	Aguadulce
<i>ocularis</i>	BMNH89.1.30.113	M	Panama	Veragua	Calobre
<i>ocularis</i>	BMNH89.1.30.117	F	Panama		Isthmus of Panama
<i>ocularis</i>	BMNH90.6.1.62	NA	Panama	Veragua	NA
<i>ocularis</i>	BMNH72.2.8.7	F	Panama	Veragua	NA
<i>ocularis</i>	MNHN249	NA	Panama	Porto Armurelles	Chiriquí
<i>ocularis</i>	MNHN250	NA	Panama	Porto Armurelles	Chiriquí
<i>ocularis</i>	MNHN252	NA	Panama	Porto Armurelles	Chiriquí
<i>ocularis</i>	MNHN251	NA	Panama	Porto Armurelles	Chiriquí
<i>ocularis</i>	MNHN464	NA	Panama	Porto Armurelles	Chiriquí
<i>ocularis</i>	MNHN248	NA	Panama	Porto Armurelles	Chiriquí
<i>surinama</i>	AMNH474483	M	Suriname	NA	NA
<i>surinama</i>	AMNH474482	NA	Suriname		Paramaribo
<i>surinama</i>	AMNH474479	F	Suriname		Paramaribo
<i>surinama</i>	AMNH177102	M	Venezuela	Monagas	Las Barrancas
<i>surinama</i>	AMNH474478	M	Suriname		Paramaribo
<i>surinama</i>	AMNH474481	NA	Suriname		Paramaribo
<i>surinama</i>	AMNH474480	F	Suriname		Paramaribo
<i>surinama</i>	FMNH108130	NA	Guyana	Buxton	East Coast
<i>surinama</i>	FMNH91864	M	Venezuela	Delta Amacuro	Piacoa
<i>surinama</i>	FMNH190576	F	Guyana		Abary River
<i>surinama</i>	FMNH190577	M	Guyana		Abary River
<i>surinama</i>	FMNH108135	M	Guyana	Buxton	East Coast
<i>surinama</i>	FMNH108132	M	Guyana	Buxton	East Coast
<i>surinama</i>	FMNH32211	M	Guyana		Georgetown

<i>surinama</i>	FMNH108129	F	Guyana	Buxton	East Coast
<i>surinama</i>	BMNH1902.10.31.2	F	Suriname		Paramaribo
<i>surinama</i>	BHMN90.6.1.64	NA	French Guiana	NA	NA
<i>chrysophrys</i>	AMNH474485	M	Guyana		Annai
<i>chrysophrys</i>	AMNH474489	M	Guyana		Annai
<i>chrysophrys</i>	AMNH236351	F	Brazil	Rio Surumu	Frechal
<i>chrysophrys</i>	AMNH236347	M	Brazil	Rio Surumu	Frechal
<i>chrysophrys</i>	AMNH236346	F	Brazil	Rio Cotinga	Limaó
<i>chrysophrys</i>	AMNH44709	NA	NA	NA	NA
<i>chrysophrys</i>	AMNH474487	F	Guyana		Annai
<i>chrysophrys</i>	AMNH474490	F	Guyana	NA	NA
<i>chrysophrys</i>	AMNH474491	M	Guyana	NA	NA
<i>chrysophrys</i>	AMNH44707	NA	NA	NA	NA
<i>chrysophrys</i>	AMNH236348	M	Brazil	Rio Surumu	Frechal
<i>chrysophrys</i>	AMNH236345	M	Brazil	Rio Cotinga	Limaó
<i>chrysophrys</i>	AMNH236349	M	Brazil	Rio Surumu	Frechal
<i>chrysophrys</i>	AMNH474488	F	Guyana		Roraima
<i>chrysophrys</i>	AMNH474484	M	Guyana		Annai
<i>chrysophrys</i>	AMNH236350	F	Brazil	Rio Surumu	Frechal
<i>chrysophrys</i>	AMNH474486	F	Guyana		Annai
<i>chrysophrys</i>	MZUSP55820	M	Brazil	Roraima	Faz. Mucajai , Rio Mucajai, Tributário do Rio Branco
<i>chrysophrys</i>	MZUSP55821	F	Brazil	Roraima	Faz. Mucajai , Rio Mucajai, Tributário do Rio Branco
<i>chrysophrys</i>	MZUSP55822	F	Brazil	Roraima	Baixo Mucajaí, afl. Rio Branco, Sul de Boa Vista
<i>chrysophrys</i>	MZUSP55823	M	Brazil	Roraima	Baixo Mucajaí, afl. Rio Branco, Sul de Boa Vista
<i>chrysophrys</i>	MZUSP55824	F	Brazil	Roraima	Baixo Mucajaí, afl. Rio Branco, Sul de Boa Vista
<i>chrysophrys</i>	MZUSP55825	F	Brazil	Roraima	Baixo Mucajaí, afl. Rio Branco, Sul de Boa Vista
<i>chrysophrys</i>	MZUSP77937	M	Brazil	Roraima	Faz. Santa Teresa, Boa Vista
<i>chrysophrys</i>	MZUSP77938	M	Brazil	Roraima	Faz. Santa Teresa, Boa Vista
<i>chrysophrys</i>	MZUSP79090	F	Brazil	Roraima	Faz. Encrenca, Amajari
<i>chrysophrys</i>	USNM627450	M	Guyana		Abary River
<i>chrysophrys</i>	USNM625359	M	Guyana		Abary River
<i>chrysophrys</i>	USNM627403	F	Guyana	South Rupununi Savannah	Kusad Mountain, NE flank
<i>chrysophrys</i>	USNM626224	F	Guyana	East Rupununi Savannah	Wiwitau Mountain
<i>chrysophrys</i>	USNM632844	M	Guyana	Upper Takutu-Upper Essequibo	Karasabai, ca 17 km SSW at Ireng River
<i>surinama</i>	USNM145669	NA	Lesser Antilles		Trinidad
<i>venezuelae</i>	USNM329505	M	Venezuela	Bolivar	Bolivar
<i>surinama</i>	USNM145668	NA	Lesser Antilles		Trinidad

<i>surinama</i>	USNM145667	NA	Lesser Antilles		Trinidad
<i>chrysophrys</i>	LSUMZ175331	F	Guyana	Ireng River	17 km SW Karasabai
<i>chrysophrys</i>	FMNH108131	F	Guyana	Essequibo River	Rockstone
<i>chrysophrys</i>	FMNH371840	M	Guyana	Essequibo River	Dawa
<i>chrysophrys</i>	FMNH108133	F	Guyana	Essequibo River	Rockstone
<i>chrysophrys</i>	FMNH108134	F	Guyana	Essequibo River	Rockstone
<i>chrysophrys</i>	FMNH188826	F	NA	NA	Agua Blanca
<i>chrysophrys</i>	FMNH45051	M	Brazil	Amazonas	Boa Vista; Rio Branco
<i>chrysophrys</i>	FMNH45052	F	Brazil	Amazonas	Boa Vista; Rio Branco
<i>chrysophrys</i>	FMNH45050	M	Brazil	Amazonas	Serra Grande, Rio Branco
<i>chrysophrys</i>	BMNH92.1.16.63	M	Guyana		Quonga
<i>chrysophrys</i>	BMNH89.1.30.120	M	Guyana		Roraima, 3500 ft
<i>chrysophrys</i>	BMNH1922.3.5.1214	NA	Guyana		Upper Takutu
<i>chrysophrys</i>	BMNH92.1.16.62	NA	Guyana		Quonga
<i>chrysophrys</i>	BMNH95.11.28.140	F	Guyana		NA
<i>chrysophrys</i>	BMNH40.7.3.71	NA	Guyana		NA
<i>chrysophrys</i>	BMNH1922.3.5.1217	NA	Guyana		Bonasica River
<i>chrysophrys</i>	BMNH89.1.30.121	F	Guyana		Roraima, 3500 ft
<i>chrysophrys</i>	BMNH90.6.1.57	NA	Guyana		Roraima
<i>chrysogenys</i>	ANSP22333	NA	Colombia	NA	NA
<i>chrysogenys</i>	AMNH310235	M	Brazil	Rio Negro	Yavanari
<i>chrysogenys</i>	AMNH310237	F	Brazil	Rio Negro	Yavanari
<i>chrysogenys</i>	AMNH310234	M	Brazil	Rio Negro	Yavanari
<i>chrysogenys</i>	AMNH310..	M	Brazil	Rio Negro	Yavanari
<i>chrysogenys</i>	AMNH310233	F	Brazil	Rio Negro	Tabocal
<i>chrysogenys</i>	MZUSP93616	M	Brazil	Amazonas	Barcelos, rio Jufari, "Ilha da Campina"
<i>chrysogenys</i>	USNM328375	M	Venezuela	Upper Orinoco	Cerro Yapacana
<i>chrysogenys</i>	BMNH90.6.1.65	NA	Brazil	Rio Negro	NA
<i>chrysogenys</i>	BMNH59.11.22.7	NA	Brazil	Rio Negro	NA
<i>griseipecta</i>	USNM410668	F	Colombia	Cordoba, Rio Sinú	Tierra Alta
<i>griseipecta</i>	ANSP160393	NA	Colombia	Bolivar	Tierra Alta

Appendix 2. List of the examined skeletons, where “NA” refers to missing data and “complex” to those specimens that could not be identified at species level.

Taxon	Number	sex	observations	Locality/Donor
<i>aurea</i> complex	MZUSP89288	M	captivity	NA
<i>aurea</i> complex	MZUSP89265	M		NA
<i>aurea</i> complex	MZUSP89266	M		NA
<i>aurea</i> complex	MZUSP90384	NA		NA
<i>aurea</i> complex	MZUSP90348	NA		NA
<i>aurea</i> complex	MZUSP89267	M		NA
<i>aurea</i> complex	MZUSP89252	F		NA
<i>aurea</i> complex	MZUSP89289	F		NA
<i>aurea</i> complex	AMNH1802	NA		NA
<i>aurea</i> complex	AMNH3948	NA	captivity	New York, Zoological Park
<i>a. aurea</i>	USNM321596	NA		San Matheos, Brazil
<i>a. aurea</i>	USNM345862	M		Near Tres Barras, Head Rio Paraguay, Mato Grosso, Brazil
<i>a. aurea</i>	USNM289767	F	captivity	P. Standley
<i>a. aurea</i>	USNM345861	F		Near Tres Barras, Rio Paraguay, Mato Grosso, Brazil
<i>a. major</i>	USNM288216	NA	captivity	Rio Beni, Bolivia
<i>aurea</i> complex	LSUMZ161194	M	captivity	São Paulo Zoo, Brazil
<i>aurea</i> complex	LSUMZ125701	M		Dpto. Santa Cruz, prov. Ibanez, 1 km N, 1 km E YPFB Refinery, ca 10 km S Santa Cruz, 425 m, Bolivia
<i>aurea</i> complex	FMNH350814	M	captivity	T. Silva
<i>aurea</i> complex	FMNH337794	F	captivity	Busch Gardens
<i>aurea</i> complex	FMNH337795	M	captivity	Busch Gardens
<i>n. astec</i>	USNM428270	M	captivity	Natural Zoological Park
<i>n. astec</i>	USNM606739	F		Bocas del Toro. Panama. Isla Cristobal, Bocatorito
<i>n. astec</i>	USMN612289	M		Bocas del Toro. Panama. Isla Cristobal, Bocatorito
<i>n. vicinalis</i>	AMNH12645	NA		Mexico, Tamaulipas
<i>n. vicinalis</i>	AMNH12576	NA		Mexico, Tamaulipas
<i>n. astec</i>	BMNH1869.10.19.31	NA	captivity	Zoological Society of London
<i>n. astec</i>	LSUMZ31850	F		Sta. Barbara, 4 mi SW Jaral 3000, Honduras
<i>n. astec</i>	FMNH317858	F		20 km S Jesus Carranza, Veracruz, Mexico
<i>n. nana</i>	BMNH1847.6.16.43	NA	sternum	Gosse
<i>n. nana</i>	USMN559177	F		Trelawny, 7 mi N of Quickstep, Jamaica.
<i>n. nana</i>	USMN559173	M		Trelawny, 9.5 mi N of Quickstep, Jamaica.
<i>n. nana</i>	USNM558862	M		Trelawny, Quickstep, Jamaica
<i>n. nana</i>	USNM559174	M		Trelawny, 1.5 mi N of Quickstep, Jamaica
<i>n. nana</i>	USNM558865	M		Trelawny, 1 m N of Quickstep, Jamaica
<i>n. nana</i>	USNM558863	M		Trelawny, Quickstep, Jamaica
<i>n. nana</i>	USNM 559172	M		Trelawny, 5.9 mi N of Quickstep, Jamaica
<i>n. astec</i>	LSUMZ162139	M		prov. Alajuela, 16 km NNE Pital Chaparron, Costa Rica

<i>n. astec</i>	FMNH337785	F		Tortuguero, Limon, Costa Rica
<i>canicularis</i> complex	AMNH6267	NA	captivity	Central Park Zoo
<i>c. canicularis</i>	AMNH8316	M		Guatemala
<i>c. eburnirostrum</i>	AMNH16760	F	captivity	Aviary Bid
<i>canicularis</i> complex	AMNH2861	F	captivity	New York, Zoological Park
<i>canicularis</i> complex	AMNH8216	NA		NA
<i>c. canicularis</i>	AMNH8318	NA		Guatemala
<i>canicularis</i> complex	USNM346606	M	captivity	Natural Zoological Park
<i>canicularis</i> complex	USNM292922	M	captivity	Natural Zoological Park
<i>canicularis</i> complex	USNM320001	NA		E.S. Schmid
<i>canicularis</i> complex	USNM319452	F	captivity	Natural Zoological Park
<i>canicularis</i> complex	USNM322651	F	captivity	Natural Zoological Park
<i>canicularis</i> complex	USNM322006	NA	captivity	Mrs C.H. Popende
<i>canicularis</i> complex	USNM346175	NA	captivity	Natural Zoological Park
<i>c. canicularis</i>	AMNH8317	NA		Guatemala
<i>canicularis</i> complex	LSUMZ71110	M	captivity	Houston Zoological garden
<i>canicularis</i> complex	LSUMZ71109	F	captivity	Houston Zoological garden
<i>c. canicularis</i>	LSUMZ48552	M		Guanacasta, prov.Bebedero, km 2073, Costa Rica
<i>c. canicularis</i>	LSUMZ31851	F		Choluteca, 6 mi NE Choluteca, 200, Honduras
<i>canicularis</i> complex	LSUMZ160336	F	captivity	Ed. Luber Aviary
<i>c. canicularis</i>	FMNH376411	F		Los Chocoyos, Managua, Nicaragua
<i>c. canicularis</i>	FMNH337787	F		Finca Jimenez, Guanacaste; Costa Rica
<i>c. canicularis</i>	FMNH337786	F		Finca Jimenez, Guanacaste; Costa Rica
<i>c. canicularis</i>	FMNH376412	F		Los Chocoyos, Managua, Nicaragua
<i>pertinax</i> complex	MZUSP 89253	M		NA
<i>pertinax</i> complex	AMNH 12904	M	captivity	Novak's Aviary, Guyana
<i>pertinax</i> complex	AMNH 14313	M	captivity	Novak's Aviary, Guyana
<i>pertinax</i> complex	AMNH 12902	M	captivity	Novak's Aviary, Guyana
<i>pertinax</i> complex	BMNHs/1990.3.1	NA	died in transit	London
<i>p. ocularis</i>	USNM347334	M		Los Santos, Monagre, 5 mi NE, Panama
<i>p. ocularis</i>	USNM431633	M		Cocle, Potrero, Panama
<i>p. chrysophrys</i>	USNM621059	M		Berbice District, West Bank Berbice River, Dubulay Ranch, 05°40'N 057°53' W. Guyana
<i>p. ocularis</i>	USNM429194	M		Llano del Jardino, Sona Veraguas, 15 miles E, Panama
<i>p. venezuelae</i>	USNM344084	F		Carapito, Venezuela
<i>p. pertinax</i>	USNM499069	F		Curaçao, Lesser Antillies
<i>p. ocularis</i>	USNM347335	F		Los Santos, Monagre, 5 mi NE, Panama

<i>pertinax</i> complex	AMNH3383	M		NA
<i>pertinax</i> complex	AMNH4955	NA	captivity	New York, Zoological Park
<i>p. venezuelae</i>	LSUMZ68993	M		Aragua, El Limon M. Castro 53, Venezuela.
<i>p. venezuelae</i>	FMNH337793	F		Upata, Bolivar, Venezuela
<i>p. lehmanni</i>	FMNH297429	M		Carimagua, Meta, Colombia
<i>p. surinama</i>	FMNH105571	F		Buxton, Demerara, Guyana
<i>p. surinama</i>	FMNH105572	F		Buxton, Demerara, Guyana

Appendix 3. Morphological characters examined for species of the genus *Eupsittula*, coded according to the catalogue of Smithe.

Character	<i>E. canicularis</i>	<i>E. astec</i>	<i>E. nana</i>	<i>E. pertinax</i>	<i>E. ocularis</i>	<i>E. arubensis</i>
Bill	Smoke Gray 45	Smoke Gray 45	Smoke Gray 45	Sepia 119	Sepia 119	Sepia 119
Tarsus	Sepia 119	Sepia 119	Sepia 119	Sepia 119	Sepia 119	Sepia 119
Periophthalmic ring	Orange Yellow 18	white	white	black	white	white
Area around eye	Spectrum Orange 17, Cerulean Blue 67 and Grayish Olive 43	Parrot Green 260	Parrot Green 260	Orange Yellow 18 mixed with Spectrum Orange 17	Orange Yellow 18 below and in front of eye	Orange Yellow 18
Forehead	Burnt Orange 116	Parrot Green 260 and Spectrum Orange 17 on nares	Parrot Green 260	Orange Yellow 18	dull Cerulean Blue 67	Orange Yellow 18
Crown	Spectrum Orange 17 and Cerulean Blue 67	Parrot Green 260	Parrot Green 260	Orange Yellow 18 and Cerulean Blue 67, sometimes with some Parrot Green 260	dull Cerulean Blue 67	Cerulean Blue 67
Nape	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Cheeks	Grayish Olive 43	Lime Green 159	Lime Green 159	Orange Yellow 18 mixed with Spectrum Orange 17	Brownish Olive 29	Orange Yellow 18 in the upper part and Color Buff 124 mixed with Fawn Color 25 in the rest
Auriculars	Grayish Olive 43 with Cerulean Blue 67 tinge	Lime Green 159	Lime Green 159	Orange Yellow 18 mixed with Spectrum Orange 17	Brownish Olive 29	Orange Yellow 18 in the upper part and Color Buff 124 mixed with Fawn Color 25 in the rest
Upper throat	Grayish Olive 43	Brownish Olive 29	dark Brownish Olive 29	Orange Yellow 18 mixed with Spectrum Orange 17	Brownish Olive 29	Orange Yellow 18 mixed with Grayish Olive 43

Character	<i>E. canicularis</i>	<i>E. astec</i>	<i>E. nana</i>	<i>E. pertinax</i>	<i>E. ocellaris</i>	<i>E. arubensis</i>
Throat	Grayish Olive 43	Brownish Olive 29	dark Brownish Olive 29	Grayish Olive 43	Brownish Olive 29	Orange Yellow 18 mixed with Grayish Olive 43
Dorsal neck	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Scapulars	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Lesser underwing-coverts	Yellow-Green 58	Yellow-Green 58	Yellow-Green 58	Yellow-Green 58	Yellow-Green 58	Yellow-Green 58
Greater underwing-coverts	Yellow-Green 58	Yellow-Green 58	Yellow-Green 58	Yellow-Green 58	Yellow-Green 58	Yellow-Green 58
Bend of wing	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Lesser wing-coverts	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Median wing-coverts	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Carpal edge	Parrot Green 260 and Cerulean Blue 67	Parrot Green 260 and Cerulean Blue 67	Parrot Green 260 and Cerulean Blue 67	Parrot Green 260 and Cerulean Blue 67	Parrot Green 260 and Cerulean Blue 67	Parrot Green 260 and Cerulean Blue 67
Gr. Primary coverts	Parrot Green 260 and Indigo Blue 173	Parrot Green 260 and Indigo Blue 173	Parrot Green 260 and Indigo Blue 173	Paris Green 63	Paris Green 63	Paris Green 63
Gr. Secondary coverts	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Folded secondaries	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Rump	Lime Green 159	Lime Green 159	Lime Green 159	Lime Green 159	Lime Green 159	Lime Green 159
Breast	Grayish Olive 43	Brownish Olive 29	dark Brownish Olive 29	Grayish Olive 43	Brownish Olive 29	Grayish Olive 43

Character	<i>E. canicularis</i>	<i>E. astec</i>	<i>E. nana</i>	<i>E. pertinax</i>	<i>E. ocellaris</i>	<i>E. arubensis</i>
Belly	Yellow-Green 58	Citrine 51	dark Citrine 51	Yellow-Green 58 mixed with Orange Yellow 18	Yellow-Green 58 mixed with Orange Yellow 18	Yellow-Green 58 mixed with Orange Yellow 18
Crural feathers	Yellow-Green 58	Yellow-Green 58	Lime Green 159	Yellow-Green 58 mixed with Orange Yellow 18	Yellow-Green 58 mixed with Orange Yellow 18	Yellow-Green 58 mixed with Orange Yellow 18
Primaries	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges
Secondaries	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges
Underwing-coverts	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43
Uppertail	Parrot Green 260 and Paris Green 63	Parrot Green 260 and Paris Green 63	Parrot Green 260 and Paris Green 63	Parrot Green 260 and Paris Green 63	Parrot Green 260 and Paris Green 63	Parrot Green 260 and Paris Green 63
Undertail	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43

Character	<i>E. xanthogenia</i>	<i>E. tortugensis</i>	<i>E. aeruginosa</i>	<i>E. margaritensis</i>	<i>E. chrysophrys</i>	<i>E. surinama</i>
Bill	Sepia 119	Sepia 119	Sepia 119	Sepia 119	Sepia 119	Sepia 119
Tarsus	Sepia 119	Sepia 119	Sepia 119	Sepia 119	Sepia 119	Sepia 119
Periophthalmic ring	black	black	white	white	white	white
Area around eye	Orange Yellow 18 mixed with Spectrum Orange 17	Orange Yellow 18	thin ring of Orange Yellow 18/Cerulean Blue 67 and Color Buff 124 with Fawn Color 25 edges	Orange Yellow 18	Orange Yellow 18	Orange Yellow 18 mixed with Spectrum Orange 17
Forehead	Orange Yellow 18	dull Orange Yellow 18	Color Buff 124	Color Buff 124	dull Orange Yellow 18	dull Orange Yellow 18
Crown	Orange Yellow 18/ Orange Yellow 18 mixed with Cerulean Blue 67 and Parrot Green 260	Cerulean Blue 67	Cerulean Blue 67	Cerulean Blue 67	Cerulean Blue 67	Cerulean Blue 67
Nape	Orange Yellow 18/ Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Cheeks	Orange Yellow 18 mixed with Spectrum Orange 17	Orange Yellow 18 in the upper part and Orange Yellow 18 mixed with Fawn Color 25 in the lower	Color Buff 124 with Fawn Color 25 edges	Smoke Gray 45 with some Color Buff 124	Fawn Color 25 with little Color Buff 124	Orange Yellow 18 mixed with Spectrum Orange 17
Auriculars	Orange Yellow 18 mixed with Spectrum Orange 17	Orange Yellow 18 in the upper part and Orange Yellow 18 mixed with Fawn Color 25 in the lower	Color Buff 124 with Fawn Color 25 edges	Smoke Gray 45 with some Color Buff 124	Fawn Color 25 with little Color Buff 124	Orange Yellow 18 mixed with Spectrum Orange 17 in the upper part and Orange Yellow 18 with Fawn Color 25 in the lower

Character	<i>E. xanthogenia</i>	<i>E. tortugensis</i>	<i>E. aeruginosa</i>	<i>E. margaritensis</i>	<i>E. chrysophrys</i>	<i>E. surinama</i>
Upper throat	Orange Yellow 18 mixed with Spectrum Orange 17	Orange Yellow 18 mixed with Grayish Olive 43	Color Buff 124 with Fawn Color 25 edges	Smoke Gray 45 with some Color Buff 124	Brownish Olive 29	Orange Yellow 18 mixed with Grayish Olive 43
Throat	Orange Yellow 18 mixed with Spectrum Orange 17	Orange Yellow 18 mixed with Grayish Olive 43	Color Buff 124 with Fawn Color 25 edges	Smoke Gray 45 with some Color Buff 124	Brownish Olive 29	Orange Yellow 18 mixed with Grayish Olive 43
Scapulars	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Dorsal neck	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Lesser underwing-coverts	Yellow-Green 58	Yellow-Green 58	Yellow-Green 58	Yellow-Green 58	Yellow-Green 58	Yellow-Green 58
Greater underwing-coverts	Yellow-Green 58	Yellow-Green 58	Yellow-Green 58	Yellow-Green 58	Yellow-Green 58	Yellow-Green 58
Bend of wing	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Lesser wing-coverts	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Median wing-coverts	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Carpal edge	Parrot Green 260 and Cerulean Blue 67	Parrot Green 260 and Cerulean Blue 67	Parrot Green 260 and Cerulean Blue 67	Parrot Green 260 and Cerulean Blue 67	Parrot Green 260 and Cerulean Blue 67	Parrot Green 260 and Cerulean Blue 67
Gr. Primary coverts	Paris Green 63	Paris Green 63	Paris Green 63	Paris Green 63	Paris Green 63	Paris Green 63
Gr. Secondary coverts	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Folded secondaries	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260

Character	<i>E. xanthogenia</i>	<i>E. tortugensis</i>	<i>E. aeruginosa</i>	<i>E. margaritensis</i>	<i>E. chrysopterys</i>	<i>E. surinama</i>
Rump	Lime Green 159	Lime Green 159	Lime Green 159	Lime Green 159	Lime Green 159	Lime Green 159
Breast	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43
Belly	Yellow-Green 58 mixed with Orange Yellow 18	Yellow-Green 58 mixed with Orange Yellow 18	Yellow-Green 58 mixed with Orange Yellow 18	Yellow-Green 58 mixed with Orange Yellow 18	Yellow-Green 58 mixed with Orange Yellow 18	Yellow-Green 58 mixed with Orange Yellow 18
Crural feathers	Yellow-Green 58 mixed with Orange Yellow 18	Yellow-Green 58 mixed with Orange Yellow 18	Yellow-Green 58 mixed with Orange Yellow 18	Yellow-Green 58 mixed with Orange Yellow 18	Yellow-Green 58 mixed with Orange Yellow 18	Yellow-Green 58 mixed with Orange Yellow 18
Primaries	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges
Secondaries	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges
Underwing-coverts	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43
Uppertail	Parrot Green 260 and Paris Green 63	Parrot Green 260 and Paris Green 63	Parrot Green 260 and Paris Green 63	Parrot Green 260 and Paris Green 63	Parrot Green 260 and Paris Green 63	Parrot Green 260 and Paris Green 63
Undertail	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43

Character	<i>E. paraensis</i>	<i>E. aurea</i>	<i>E. cactorum</i>
Bill	Sepia 119	Sepia 119	Smoke Gray 45
Tarsus	Sepia 119	Sepia 119	Sepia 119
Periophthalmic ring	NA	Sepia 119	white
Area around eye	Orange Yellow 18 below and behind the eye	Orange Yellow 18	Parrot Green 260
Forehead	dull Cerulean Blue 67	Burnt Orange 116	dull Cerulean Blue 67
Crown	dull Cerulean Blue 67	Spectrum Orange 17 and Cerulean Blue 67	dull Cerulean Blue 67
Nape	Parrot Green 260	Parrot Green 260	Parrot Green 260
Cheeks	dark Brownish Olive 29	Grayish Olive 43	Smoke Gray 45
Auriculars	dark Brownish Olive 29	Grayish Olive 43 with Cerulean Blue 67 tinge	Parrot Green 260
Upper throat	Brownish Olive 29	Grayish Olive 43	Smoke Gray 45
Throat	Brownish Olive 29	Grayish Olive 43	Smoke Gray 45
Dorsal neck	Parrot Green 260	Parrot Green 260	Parrot Green 260
Scapulars	Parrot Green 260	Parrot Green 260	Parrot Green 260
Lesser underwing-coverts	Yellow-Green 58	Yellow-Green 58	Yellow-Green 58
Greater underwing-coverts	Yellow-Green 58	Yellow-Green 58	Yellow-Green 58
Bend of wing	Parrot Green 260	Parrot Green 260	Parrot Green 260
Lesser wing-coverts	Parrot Green 260	Parrot Green 260	Parrot Green 260
Median wing-coverts	Parrot Green 260	Parrot Green 260	Parrot Green 260
Carpal edge	Parrot Green 260 and Cerulean Blue 67	Parrot Green 260 and Cerulean Blue 67	Parrot Green 260 and Cerulean Blue 67
Gr. Primary coverts	Paris Green 63	Indigo blue 173 with Jet Black 89 edges	Indigo blue 173 with Jet Black 89 edges
Gr. Secondary coverts	Parrot Green 260	Parrot Green 260	Parrot Green 260
Folded secondaries	Parrot Green 260	Parrot Green 260	Parrot Green 260
Rump	Lime Green 159	Lime Green 159	Lime Green 159
Breast	Grayish Olive 43	Grayish Olive 43	Smoke Gray 45
Belly	Yellow-Green 58 mixed with Orange Yellow 18	Yellow-Green 58	Orange Yellow 18
Crural feathers	Yellow-Green 58 mixed with Orange Yellow 18	Yellow-Green 58	Yellow-Green 58 mixed with Orange Yellow 18

Character	<i>E. paraensis</i>	<i>E. aurea</i>	<i>E. cactorum</i>
Primaries	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges
Secondaries	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges	Paris Green 63, Cerulean Blue 67 with Jet Black 89 edges
Underwing-coverts	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43
Uppertail	Parrot Green 260 and Paris Green 63	Parrot Green 260 and Paris Green 63	Parrot Green 260 and Paris Green 63
Undertail	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43

Appendix 4. List of osteological characters examined, with reference to the author, when the character was taken from the literature.

Character	Character state	Author
orbit	complete/incomplete	Machado <i>et al.</i> 2006, Alvarenga 2007, Tokita 2003, Tokita <i>et al.</i> 2007
<i>proc. zygomaticus</i> length	short/medium	Machado <i>et al.</i> 2006, Gaban-Lima 2007
<i>proc. zygomaticus</i> shape	rounded/pointed	
<i>proc. lacrimalis</i> shape	rounded/pointed	
ridge on <i>fossa temporalis</i>	present/absent	
deep <i>fossa temporalis</i>	present/absent	
marked foramina in the supraorbital region	present/absent	
marked <i>crista nuchalis transversa</i>	present/absent	
<i>crista nuchalis transversa</i> shape	M/reverse U	Brito 2008
<i>crista nuchalis transversa</i> reaching the <i>proc. paraoccipitalis</i>	present/absent	
<i>proc. paraoccipitalis</i> shape	rounded/pointed	Brito 2008
ridge on <i>ala parasphenoidalis</i>	present/absent	
<i>arcus suborbitalis</i> touching the <i>arcus jugalis</i>	present/absent	
<i>fenestra antorbitalis</i> shape	rounded/triangular	
lacrimal almost closing the antorbital fenestra	present/absent	
<i>rostrum maxillae</i> shape	isosceles triangle/equilateral triangle	
<i>proc. retroarticularis</i> shape	triangular obtuse/ triangular acute	Gaban-Lima 2007
indent on median portion of the <i>proc. orbitalis</i> of the lacrimal	present/absent	Brito 2008
<i>foramen pneumaticum palatini</i> size	small/large	
space between <i>os maxillare</i> and <i>os palatinum</i>	present/absent	
notch on region of the <i>os maxillare</i>	present/absent	
contact region between the pterygoid and caudal portion of <i>os palatinum</i>	present/absent	
<i>crista</i> of the median portion of <i>os palatinum</i> touching the pterygoid	present/absent	
<i>fenestra caudalis mandibulae</i> presence	present/absent	Gaban-Lima 2007
<i>fenestra rostralis mandibulae</i> presence	present/absent	Gaban-Lima 2007
<i>proc. medialis mandibulae</i> shape	pointed/rounded	Gaban-Lima 2007
<i>foramen obturatum</i>	open/closed	
<i>ala preacetabularis ilii</i> shape	rounded/pointed	
prominent <i>tuberculum preacetabulare</i>	present/absent	
<i>sutura iliosynsacralis</i> shape	open/closed	
<i>proc. marginis caudalis</i> shape	rounded/pointed	
<i>spina externa rostri</i> shape	thick/thin	
<i>proc. craniolateralis</i> shape	rounded/pointed	
<i>apex carinae</i> shape	rounded/pointed	

Character	Character state	Author
<i>tuberculum cristae medianae</i>	present/absent	
<i>pila coracoidea</i> with V shape	present/absent	
<i>margo caudalis</i> shape	triangular/squared	
prominent <i>tuberculum supracondylare ventrale</i>	present/absent	
<i>pons supratendineus</i> ossification	completely ossified/incompletely ossified	Mayr 2010
<i>spina fibulae</i> ending at <i>crista fibularis</i> level	present/absent	

Appendix 5. Pairwise comparisons between pairs of taxa reported in the literature, using Wilcoxon rank sum test, for 4 morphometric parameters. Ns = no significant difference; <0.05 = significant difference.

Taxa	Culmen	Bill width	Wing	Tarsus
<i>canicularis-aeruginosa</i>	<0.0001	Ns	Ns	Ns
<i>clarae-aeruginosa</i>	<0.05	Ns	Ns	Ns
<i>eburnirostrum-aeruginosa</i>	<0.05	Ns	Ns	Ns
<i>cactorum- aeruginosa</i>	Ns	Ns	Ns	Ns
<i>caixana- aeruginosa</i>	<0.0001	Ns	Ns	Ns
<i>perpallida- aeruginosa</i>	Ns	Ns	Ns	Ns
<i>astec- aeruginosa</i>	<0.05	<0.0001	Ns	<0.05
<i>nana- aeruginosa</i>	<0.0001	<0.0001	<0.0001	Ns
<i>vicinalis- aeruginosa</i>	<0.05	<0.05	<0.05	Ns
<i>aurea- aeruginosa</i>	<0.0001	<0.0001	<0.0001	Ns
<i>major- aeruginosa</i>	<0.05	<0.05	<0.0001	Ns
<i>pertinax- aeruginosa</i>	Ns	Ns	Ns	Ns
<i>xanthogenia- aeruginosa</i>	<0.0001	<0.05	<0.05	Ns
<i>arubensis- aeruginosa</i>	Ns	Ns	Ns	Ns
<i>tortugensis- aeruginosa</i>	Ns	Ns	<0.0001	Ns
<i>surinama- aeruginosa</i>	Ns	Ns	Ns	Ns
<i>margaritensis- aeruginosa</i>	Ns	Ns	Ns	Ns
<i>venezuelae- aeruginosa</i>	<0.05	Ns	Ns	Ns
<i>chrysogenys- aeruginosa</i>	Ns	Ns	Ns	Ns
<i>chrysophrys- aeruginosa</i>	Ns	Ns	Ns	Ns
<i>paraensis- aeruginosa</i>	Ns	Ns	Ns	Ns
<i>lehmanni- aeruginosa</i>	Ns	Ns	Ns	Ns
<i>griseipecta- aeruginosa</i>	Ns	Ns	Ns	Ns
<i>ocularis- aeruginosa</i>	Ns	Ns	Ns	Ns
<i>canicularis-arubensis</i>	Ns	Ns	Ns	Ns
<i>clarae- arubensis</i>	Ns	Ns	Ns	Ns
<i>eburnirostrum- arubensis</i>	Ns	Ns	Ns	Ns
<i>cactorum- arubensis</i>	Ns	Ns	Ns	Ns
<i>caixana- arubensis</i>	Ns	Ns	Ns	Ns
<i>perpallida- arubensis</i>	Ns	Ns	Ns	Ns
<i>astec- arubensis</i>	Ns	<0.05	Ns	Ns
<i>nana- arubensis</i>	<0.0001	<0.05	Ns	Ns
<i>vicinalis- arubensis</i>	Ns	<0.05	Ns	Ns
<i>aurea- arubensis</i>	<0.05	Ns	<0.05	Ns
<i>major- arubensis</i>	Ns	Ns	<0.05	Ns
<i>pertinax- arubensis</i>	Ns	Ns	Ns	Ns
<i>xanthogenia- arubensis</i>	<0.05	<0.05	Ns	Ns

Taxa	Culmen	Bill width	Wing	Tarsus
<i>tortugensis- arubensis</i>	Ns	Ns	<0.05	Ns
<i>surinama- arubensis</i>	Ns	Ns	Ns	Ns
<i>margaritensis- arubensis</i>	Ns	Ns	Ns	Ns
<i>venezuelae- arubensis</i>	Ns	Ns	Ns	Ns
<i>chrysogenys- arubensis</i>	Ns	Ns	Ns	Ns
<i>chrysophrys- arubensis</i>	Ns	Ns	Ns	Ns
<i>paraensis- arubensis</i>	Ns	Ns	Ns	Ns
<i>lehmanni- arubensis</i>	Ns	Ns	Ns	Ns
<i>griseipecta- arubensis</i>	Ns	Ns	Ns	Ns
<i>ocularis- arubensis</i>	Ns	Ns	Ns	Ns
<i>canicularis-astec</i>	Ns	Ns	Ns	Ns
<i>clarae- astec</i>	Ns	Ns	Ns	Ns
<i>eburnirostrum- astec</i>	Ns	Ns	Ns	Ns
<i>cactorum- astec</i>	Ns	<0.0001	Ns	Ns
<i>caixana- astec</i>	Ns	<0.0001	Ns	<0.05
<i>perpallida- astec</i>	Ns	Ns	Ns	Ns
<i>nana- astec</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>vicinalis- astec</i>	Ns	Ns	<0.0001	Ns
<i>aurea- astec</i>	<0.05	<0.0001	<0.0001	Ns
<i>major- astec</i>	Ns	<0.0001	<0.0001	<0.05
<i>pertinax- astec</i>	<0.0001	<0.0001	Ns	<0.05
<i>xanthogenia- astec</i>	<0.0001	Ns	<0.05	Ns
<i>tortugensis- astec</i>	<0.05	<0.0001	<0.0001	Ns
<i>surinama- astec</i>	<0.05	<0.0001	Ns	Ns
<i>margaritensis- astec</i>	<0.05	<0.05	Ns	Ns
<i>venezuelae- astec</i>	Ns	<0.0001	Ns	Ns
<i>chrysogenys- astec</i>	Ns	Ns	Ns	Ns
<i>chrysophrys- astec</i>	Ns	<0.0001	Ns	<0.05
<i>paraensis- astec</i>	Ns	Ns	Ns	Ns
<i>lehmanni- astec</i>	Ns	Ns	Ns	Ns
<i>griseipecta- astec</i>	Ns	Ns	Ns	Ns
<i>ocularis- astec</i>	<0.0001	<0.0001	Ns	Ns
<i>canicularis-aurea</i>	<0.05	<0.0001	<0.0001	Ns
<i>clarae- aurea</i>	Ns	<0.0001	<0.0001	Ns
<i>eburnirostrum- aurea</i>	<0.05	<0.0001	<0.0001	Ns
<i>cactorum- aurea</i>	<0.0001	<0.0001	<0.0001	Ns
<i>caixana- aurea</i>	<0.0001	<0.0001	<0.0001	Ns
<i>perpallida- aurea</i>	Ns	Ns	Ns	Ns
<i>nana- aurea</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>vicinalis- aurea</i>	<0.05	<0.0001	<0.05	Ns
<i>major- aurea</i>	Ns	Ns	Ns	Ns
<i>pertinax- aurea</i>	<0.0001	<0.0001	<0.0001	<0.05
<i>xanthogenia- aurea</i>	<0.0001	<0.0001	<0.05	Ns
<i>tortugensis- aurea</i>	<0.0001	Ns	Ns	Ns
<i>surinama- aurea</i>	<0.0001	<0.0001	<0.0001	Ns
<i>margaritensis- aurea</i>	<0.0001	<0.0001	<0.0001	Ns
<i>venezuelae- aurea</i>	<0.05	<0.0001	<0.0001	Ns
<i>chrysogenys- aurea</i>	Ns	Ns	<0.05	Ns
<i>chrysophrys- aurea</i>	<0.0001	<0.05	<0.0001	<0.05
<i>paraensis- aurea</i>	Ns	Ns	Ns	Ns
<i>lehmanni- aurea</i>	Ns	Ns	<0.05	Ns
<i>griseipecta- aurea</i>	Ns	Ns	Ns	Ns
<i>ocularis- aurea</i>	<0.0001	<0.0001	<0.0001	Ns
<i>canicularis-cactorum</i>	Ns	<0.05	Ns	Ns
<i>clarae- cactorum</i>	Ns	Ns	Ns	Ns

Taxa	Culmen	Bill width	Wing	Tarsus
<i>eburnirostrum- cactorum</i>	Ns	Ns	Ns	Ns
<i>caixana- cactorum</i>	Ns	Ns	Ns	Ns
<i>perpallida- cactorum</i>	Ns	Ns	Ns	Ns
<i>nana- cactorum</i>	<0.0001	<0.0001	<0.05	<0.05
<i>vicinalis- cactorum</i>	Ns	<0.05	<0.05	Ns
<i>major- cactorum</i>	Ns	<0.05	<0.0001	Ns
<i>pertinax- cactorum</i>	Ns	Ns	Ns	Ns
<i>xanthogenia- cactorum</i>	<0.0001	<0.05	Ns	Ns
<i>tortugensis- cactorum</i>	Ns	Ns	<0.0001	Ns
<i>surinama- cactorum</i>	Ns	Ns	Ns	Ns
<i>margaritensis- cactorum</i>	Ns	Ns	Ns	Ns
<i>venezuelae- cactorum</i>	Ns	Ns	<0.05	Ns
<i>chrysogenys- cactorum</i>	Ns	Ns	Ns	Ns
<i>chrysophrys- cactorum</i>	Ns	Ns	Ns	Ns
<i>paraensis- cactorum</i>	Ns	Ns	Ns	Ns
<i>lehmanni- cactorum</i>	Ns	Ns	Ns	Ns
<i>griseipecta- cactorum</i>	Ns	Ns	Ns	Ns
<i>ocularis- cactorum</i>	<0.05	Ns	Ns	Ns
<i>canicularis-caixana</i>	Ns	<0.0001	Ns	Ns
<i>clarae- caixana</i>	Ns	<0.0001	Ns	Ns
<i>eburnirostrum- caixana</i>	Ns	<0.0001	Ns	Ns
<i>perpallida- caixana</i>	Ns	Ns	Ns	Ns
<i>nana- caixana</i>	<0.0001	<0.0001	<0.0001	<0.05
<i>vicinalis- caixana</i>	Ns	<0.0001	<0.05	Ns
<i>major- caixana</i>	Ns	Ns	<0.0001	Ns
<i>pertinax- caixana</i>	<0.0001	Ns	Ns	Ns
<i>xanthogenia- caixana</i>	<0.0001	<0.0001	<0.05	Ns
<i>tortugensis- caixana</i>	<0.05	Ns	<0.0001	Ns
<i>surinama- caixana</i>	<0.05	Ns	Ns	Ns
<i>margaritensis- caixana</i>	<0.0001	Ns	Ns	Ns
<i>venezuelae- caixana</i>	Ns	Ns	Ns	Ns
<i>chrysogenys- caixana</i>	Ns	Ns	Ns	Ns
<i>chrysophrys- caixana</i>	Ns	Ns	Ns	Ns
<i>paraensis- caixana</i>	Ns	Ns	Ns	Ns
<i>lehmanni- caixana</i>	Ns	Ns	Ns	Ns
<i>griseipecta- caixana</i>	Ns	Ns	Ns	Ns
<i>ocularis- caixana</i>	<0.0001	<0.05	Ns	Ns
<i>clarae- canicularis</i>	Ns	Ns	Ns	Ns
<i>eburnirostrum- canicularis</i>	Ns	Ns	Ns	Ns
<i>perpallida- canicularis</i>	Ns	Ns	Ns	Ns
<i>nana- canicularis</i>	<0.0001	<0.0001	<0.05	<0.0001
<i>vicinalis- canicularis</i>	Ns	Ns	<0.05	Ns
<i>major- canicularis</i>	Ns	<0.0001	<0.0001	Ns
<i>pertinax- canicularis</i>	<0.0001	<0.0001	Ns	<0.05
<i>xanthogenia- canicularis</i>	<0.0001	Ns	<0.05	Ns
<i>tortugensis- canicularis</i>	<0.05	<0.05	<0.0001	Ns
<i>surinama- canicularis</i>	<0.05	<0.05	Ns	Ns
<i>margaritensis- canicularis</i>	<0.05	Ns	Ns	Ns
<i>venezuelae- canicularis</i>	Ns	<0.05	Ns	Ns
<i>chrysogenys- canicularis</i>	Ns	Ns	Ns	Ns
<i>chrysophrys- canicularis</i>	Ns	<0.0001	Ns	<0.05
<i>paraensis- canicularis</i>	Ns	Ns	Ns	Ns
<i>lehmanni- canicularis</i>	Ns	Ns	Ns	Ns
<i>griseipecta- canicularis</i>	Ns	Ns	Ns	Ns
<i>ocularis- canicularis</i>	<0.0001	Ns	Ns	Ns

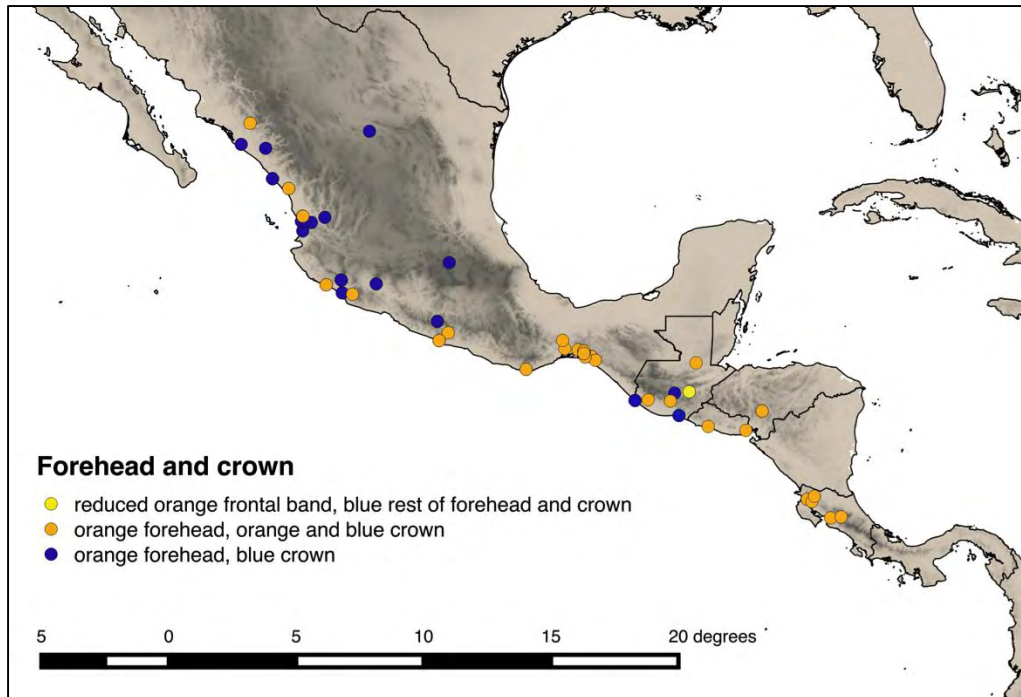
Taxa	Culmen	Bill width	Wing	Tarsus
<i>clarae- chrysogenys</i>	Ns	Ns	Ns	Ns
<i>eburnirostrum- chrysogenys</i>	Ns	Ns	Ns	Ns
<i>perpallida- chrysogenys</i>	Ns	Ns	Ns	Ns
<i>nana- chrysogenys</i>	<0.05	<0.05	Ns	Ns
<i>vicinalis- chrysogenys</i>	Ns	Ns	Ns	Ns
<i>major- chrysogenys</i>	Ns	Ns	Ns	Ns
<i>pertinax- chrysogenys</i>	Ns	Ns	Ns	Ns
<i>xanthogenia- chrysogenys</i>	Ns	Ns	Ns	Ns
<i>tortugensis- chrysogenys</i>	Ns	Ns	Ns	Ns
<i>surinama- chrysogenys</i>	Ns	Ns	Ns	Ns
<i>margaritensis- chrysogenys</i>	Ns	Ns	Ns	Ns
<i>venezuelae- chrysogenys</i>	Ns	Ns	Ns	Ns
<i>chrysophrys- chrysogenys</i>	Ns	Ns	Ns	Ns
<i>paraensis- chrysogenys</i>	Ns	Ns	Ns	Ns
<i>lehmanni- chrysogenys</i>	Ns	Ns	Ns	Ns
<i>griseipecta- chrysogenys</i>	Ns	Ns	Ns	Ns
<i>ocularis- chrysogenys</i>	Ns	Ns	Ns	Ns
<i>clarae- chrysophrys</i>	Ns	<0.05	Ns	Ns
<i>eburnirostrum- chrysophrys</i>	Ns	<0.05	Ns	<0.05
<i>perpallida- chrysophrys</i>	Ns	Ns	Ns	Ns
<i>nana- chrysophrys</i>	<0.0001	<0.0001	<0.0001	Ns
<i>vicinalis- chrysophrys</i>	Ns	<0.0001	<0.0001	Ns
<i>major- chrysophrys</i>	Ns	Ns	<0.0001	Ns
<i>pertinax- chrysophrys</i>	<0.05	Ns	Ns	Ns
<i>xanthogenia- chrysophrys</i>	<0.0001	<0.0001	<0.05	Ns
<i>tortugensis- chrysophrys</i>	Ns	Ns	<0.0001	Ns
<i>surinama- chrysophrys</i>	Ns	Ns	Ns	Ns
<i>margaritensis- chrysophrys</i>	Ns	Ns	Ns	Ns
<i>venezuelae- chrysophrys</i>	Ns	Ns	Ns	Ns
<i>paraensis- chrysophrys</i>	Ns	Ns	Ns	Ns
<i>lehmanni- chrysophrys</i>	Ns	Ns	Ns	Ns
<i>griseipecta- chrysophrys</i>	Ns	Ns	Ns	Ns
<i>ocularis- chrysophrys</i>	<0.05	Ns	Ns	Ns
<i>eburnirostrum- clarae</i>	Ns	Ns	Ns	Ns
<i>perpallida- clarae</i>	Ns	Ns	Ns	Ns
<i>nana- clarae</i>	<0.0001	<0.0001	<0.0001	<0.05
<i>vicinalis- clarae</i>	Ns	Ns	<0.0001	Ns
<i>major- clarae</i>	Ns	<0.05	<0.0001	Ns
<i>pertinax- clarae</i>	<0.05	<0.0001	<0.05	<0.05
<i>xanthogenia- clarae</i>	<0.0001	Ns	<0.05	Ns
<i>tortugensis- clarae</i>	<0.05	<0.05	<0.0001	Ns
<i>surinama- clarae</i>	Ns	Ns	Ns	Ns
<i>margaritensis- clarae</i>	<0.05	Ns	<0.05	Ns
<i>venezuelae- clarae</i>	Ns	<0.05	Ns	Ns
<i>paraensis- clarae</i>	Ns	Ns	Ns	Ns
<i>lehmanni- clarae</i>	Ns	Ns	Ns	Ns
<i>griseipecta- clarae</i>	Ns	Ns	Ns	Ns
<i>ocularis- clarae</i>	<0.0001	Ns	Ns	Ns
<i>perpallida- eburnirostrum</i>	Ns	Ns	Ns	Ns
<i>nana- eburnirostrum</i>	<0.0001	<0.0001	<0.0001	<0.05
<i>vicinalis- eburnirostrum</i>	Ns	Ns	<0.0001	Ns
<i>major- eburnirostrum</i>	Ns	<0.0001	<0.0001	Ns
<i>pertinax- eburnirostrum</i>	<0.05	<0.0001	Ns	<0.05
<i>xanthogenia- eburnirostrum</i>	<0.0001	Ns	<0.05	Ns
<i>tortugensis- eburnirostrum</i>	<0.05	<0.05	<0.0001	Ns

Taxa	Culmen	Bill width	Wing	Tarsus
<i>surinama- eburnirostrum</i>	Ns	Ns	Ns	Ns
<i>margaritensis-eburnirostrum</i>	<0.05	Ns	<0.05	Ns
<i>venezuelae- eburnirostrum</i>	Ns	<0.05	Ns	Ns
<i>paraensis- eburnirostrum</i>	Ns	Ns	Ns	Ns
<i>lehmanni- eburnirostrum</i>	Ns	Ns	Ns	Ns
<i>griseipecta- eburnirostrum</i>	Ns	Ns	Ns	Ns
<i>ocularis- eburnirostrum</i>	<0.0001	Ns	Ns	Ns
<i>perpallida- griseipecta</i>	Ns	Ns	Ns	Ns
<i>nana- griseipecta</i>	Ns	Ns	Ns	Ns
<i>vicinalis- griseipecta</i>	Ns	Ns	Ns	Ns
<i>major- griseipecta</i>	Ns	Ns	Ns	Ns
<i>pertinax- griseipecta</i>	Ns	Ns	Ns	Ns
<i>xanthogenia- griseipecta</i>	Ns	Ns	Ns	Ns
<i>tortugensis- griseipecta</i>	Ns	Ns	Ns	Ns
<i>surinama- griseipecta</i>	Ns	Ns	Ns	Ns
<i>margaritensis- griseipecta</i>	Ns	Ns	Ns	Ns
<i>venezuelae- griseipecta</i>	Ns	Ns	Ns	Ns
<i>paraensis- griseipecta</i>	Ns	Ns	Ns	Ns
<i>lehmanni- griseipecta</i>	Ns	Ns	Ns	Ns
<i>ocularis- griseipecta</i>	Ns	Ns	Ns	Ns
<i>perpallida- lehmanni</i>	Ns	Ns	Ns	Ns
<i>nana- lehmanni</i>	<0.05	<0.05	Ns	Ns
<i>vicinalis- lehmanni</i>	Ns	Ns	Ns	Ns
<i>major- lehmanni</i>	Ns	Ns	<0.05	Ns
<i>pertinax- lehmanni</i>	Ns	Ns	Ns	Ns
<i>xanthogenia- lehmanni</i>	<0.05	Ns	Ns	Ns
<i>tortugensis- lehmanni</i>	Ns	Ns	<0.05	Ns
<i>surinama- lehmanni</i>	Ns	Ns	Ns	Ns
<i>margaritensis- lehmanni</i>	Ns	Ns	Ns	Ns
<i>venezuelae- lehmanni</i>	Ns	Ns	Ns	Ns
<i>paraensis- lehmanni</i>	Ns	Ns	Ns	Ns
<i>ocularis- lehmanni</i>	Ns	Ns	Ns	Ns
<i>perpallida- major</i>	Ns	Ns	Ns	Ns
<i>nana- major</i>	<0.0001	<0.0001	<0.05	Ns
<i>vicinalis- major</i>	Ns	<0.0001	<0.05	Ns
<i>pertinax- major</i>	<0.0001	Ns	<0.0001	Ns
<i>xanthogenia- major</i>	<0.0001	<0.0001	<0.05	Ns
<i>tortugensis- major</i>	<0.05	Ns	Ns	Ns
<i>surinama- major</i>	<0.05	Ns	<0.0001	Ns
<i>margaritensis- major</i>	<0.05	<0.05	<0.05	Ns
<i>venezuelae- major</i>	Ns	Ns	<0.0001	Ns
<i>paraensis- major</i>	Ns	Ns	Ns	Ns
<i>ocularis- major</i>	<0.0001	<0.05	<0.0001	Ns
<i>perpallida- margaritensis</i>	Ns	Ns	Ns	Ns
<i>nana- margaritensis</i>	<0.0001	<0.0001	Ns	Ns
<i>vicinalis- margaritensis</i>	<0.05	<0.05	Ns	Ns
<i>pertinax- margaritensis</i>	Ns	Ns	Ns	Ns
<i>xanthogenia- margaritensis</i>	<0.05	<0.05	Ns	Ns
<i>tortugensis- margaritensis</i>	Ns	Ns	<0.05	Ns
<i>surinama- margaritensis</i>	Ns	Ns	Ns	Ns
<i>venezuelae- margaritensis</i>	<0.05	Ns	<0.05	Ns
<i>paraensis- margaritensis</i>	Ns	Ns	Ns	Ns
<i>ocularis- margaritensis</i>	Ns	Ns	Ns	Ns
<i>perpallida- nana</i>	Ns	Ns	Ns	Ns
<i>vicinalis- nana</i>	<0.0001	<0.0001	Ns	<0.05

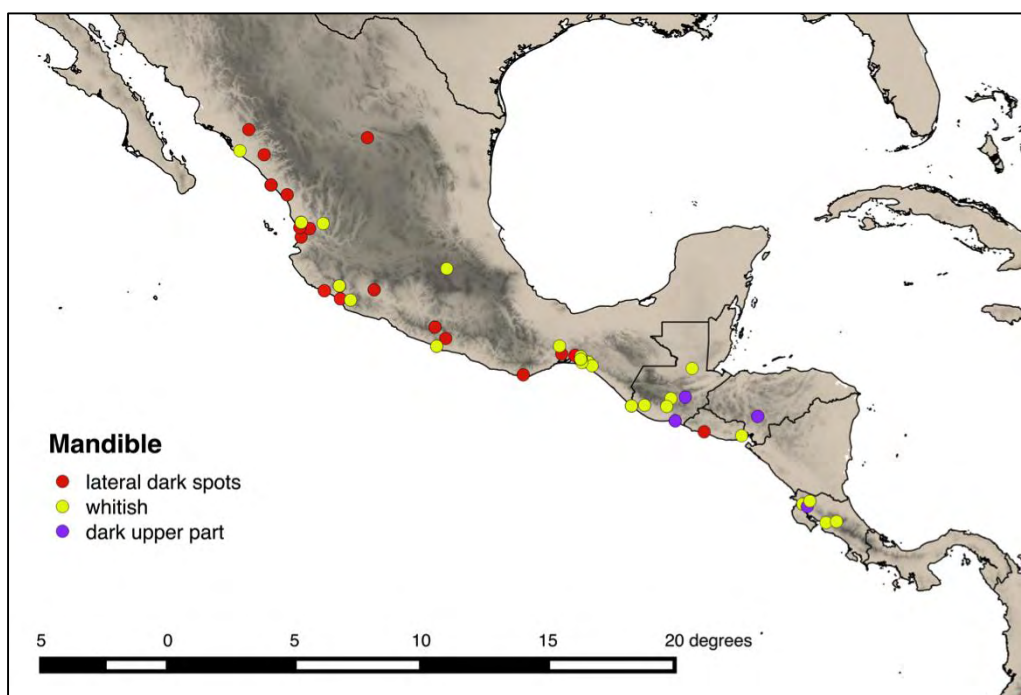
Taxa	Culmen	Bill width	Wing	Tarsus
<i>pertinax- nana</i>	<0.0001	<0.0001	Ns	Ns
<i>xanthogenia- nana</i>	Ns	<0.0001	Ns	Ns
<i>tortugensis- nana</i>	<0.05	<0.05	Ns	Ns
<i>surinama- nana</i>	<0.0001	<0.0001	<0.05	Ns
<i>venezuelae- nana</i>	<0.0001	<0.0001	<0.0001	<0.05
<i>paraensis- nana</i>	Ns	Ns	Ns	Ns
<i>ocularis- nana</i>	<0.0001	<0.0001	<0.0001	<0.05
<i>perpallida- ocularis</i>	Ns	Ns	Ns	Ns
<i>vicinalis- ocularis</i>	<0.05	<0.05	<0.0001	Ns
<i>pertinax- ocularis</i>	Ns	<0.05	Ns	Ns
<i>xanthogenia- ocularis</i>	<0.0001	<0.05	<0.05	Ns
<i>tortugensis- ocularis</i>	Ns	Ns	<0.0001	Ns
<i>surinama- ocularis</i>	Ns	Ns	Ns	Ns
<i>venezuelae- ocularis</i>	<0.05	Ns	Ns	Ns
<i>paraensis- ocularis</i>	Ns	Ns	Ns	Ns
<i>perpallida- paraensis</i>	Ns	Ns	Ns	Ns
<i>vicinalis- paraensis</i>	Ns	Ns	Ns	Ns
<i>pertinax- paraensis</i>	Ns	Ns	Ns	Ns
<i>xanthogenia- paraensis</i>	Ns	Ns	Ns	Ns
<i>tortugensis- paraensis</i>	Ns	Ns	Ns	Ns
<i>surinama- paraensis</i>	Ns	Ns	Ns	Ns
<i>venezuelae- paraensis</i>	Ns	Ns	Ns	Ns
<i>vicinalis- perpallida</i>	Ns	Ns	Ns	Ns
<i>pertinax- perpallida</i>	Ns	Ns	Ns	Ns
<i>xanthogenia- perpallida</i>	Ns	Ns	Ns	Ns
<i>tortugensis- perpallida</i>	Ns	Ns	Ns	Ns
<i>surinama- perpallida</i>	Ns	Ns	Ns	Ns
<i>venezuelae- perpallida</i>	Ns	Ns	Ns	Ns
<i>vicinalis- pertinax</i>	<0.05	<0.0001	Ns	Ns
<i>xanthogenia- pertinax</i>	<0.0001	<0.0001	Ns	Ns
<i>tortugensis- pertinax</i>	Ns	Ns	<0.05	Ns
<i>surinama- pertinax</i>	Ns	Ns	Ns	Ns
<i>venezuelae- pertinax</i>	<0.05	Ns	Ns	<0.05
<i>vicinalis- surinama</i>	Ns	<0.05	<0.05	Ns
<i>xanthogenia- surinama</i>	<0.0001	<0.05	<0.05	Ns
<i>tortugensis- surinama</i>	Ns	Ns	<0.05	Ns
<i>venezuelae- surinama</i>	Ns	Ns	Ns	Ns
<i>vicinalis- tortugensis</i>	<0.05	<0.05	<0.05	Ns
<i>xanthogenia- tortugensis</i>	<0.05	<0.05	Ns	Ns
<i>venezuelae- tortugensis</i>	Ns	Ns	<0.0001	Ns
<i>vicinalis- venezuelae</i>	Ns	<0.0001	<0.0001	Ns
<i>xanthogenia- venezuelae</i>	<0.0001	<0.05	<0.0001	Ns
<i>xanthogenia- vicinalis</i>	<0.0001	Ns	Ns	Ns

Appendix 6. Mapped character states of extension of orange on forehead and crown (A) and presence of dark spots on mandible (B) within the *E. canicularis* complex, showing that cannot be distinguished three races based on these characters.

(A) Forehead and crown coloration. Blue: orange restricted to forehead, blue crown; orange: orange forehead and half of crown, other half is blue; yellow: reduced orange frontal band on forehead, rest of forehead and crown blue.

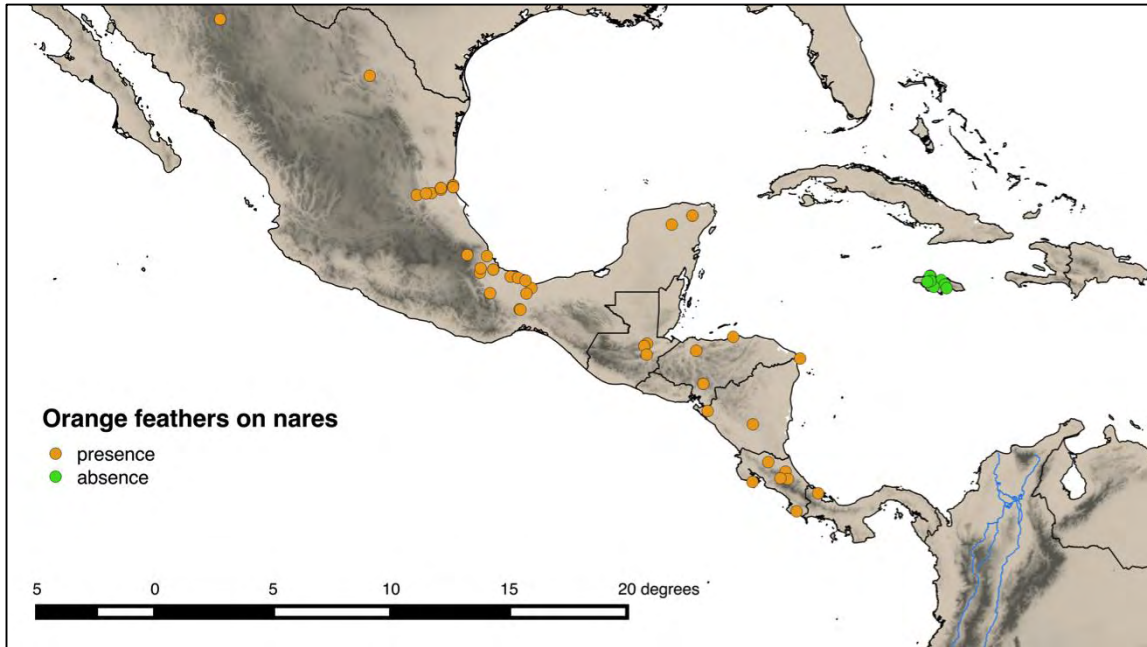


(B) Mandible coloration. Yellow: whitish, red: lateral dark spots, purple: dark upper part.

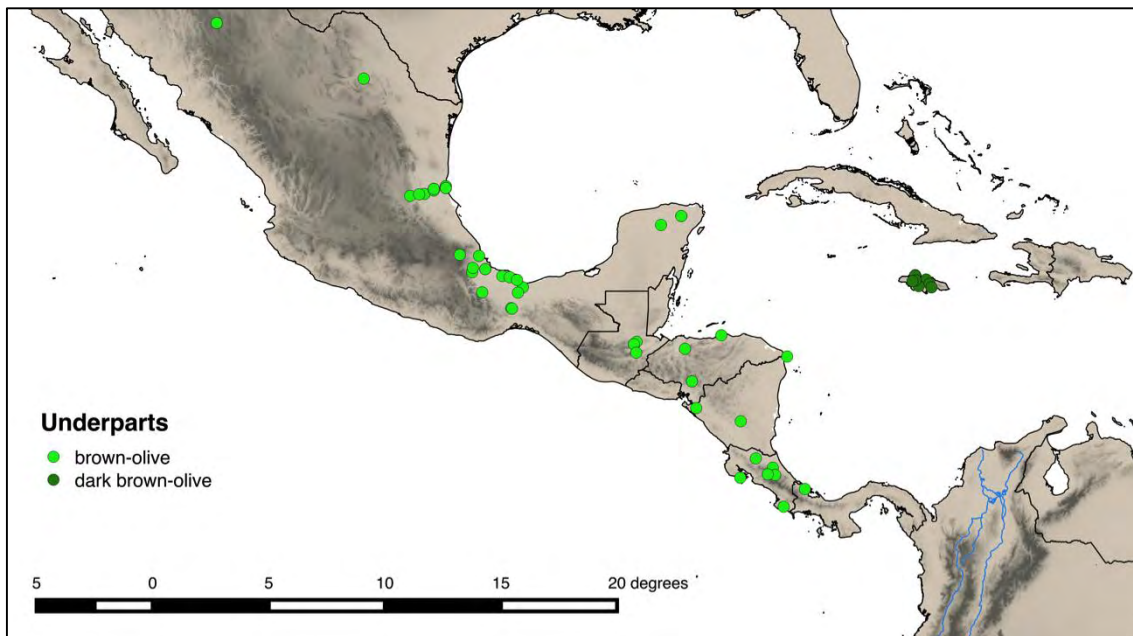


Appendix 7. Mapped character states of presence of orange feathers on nares (A) and underparts plumage (B), supporting the existence of two species within the *E. nana* complex.

(A) Presence of orange feathers on nares. Orange: present, green: absent.



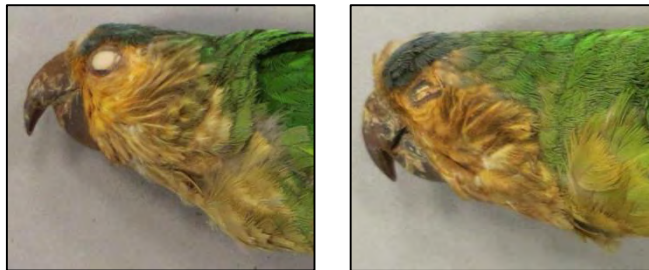
(B) Underparts coloration. Dark green: dark brown-olive, green: brown-olive.



Appendix 8. Photos from left to right of *A. p. aeruginosa* (AMNH121461), *A. p. lehmanni* (FMNH248528) and *A. p. griseipecta* (USNM410668), showing the lack of informative plumage differences.



Appendix 9. Photos from left to right of *A. p. margaritensis* (AMNH174665) and *A. p. venezuelae* (AMNH188159), showing the lack of informative plumage differences.



Appendix 10. Photos from left to right of *A. p. chrysophrys* (AMNH44709) and *A. p. chrysogenys* (AMNH310234), showing the lack of informative plumage differences.



Appendix 11. Photos from left to right of *A. a. aurea* (AMNH44698) and *A. a. major* (FMNH295976), showing the lack of informative plumage differences.

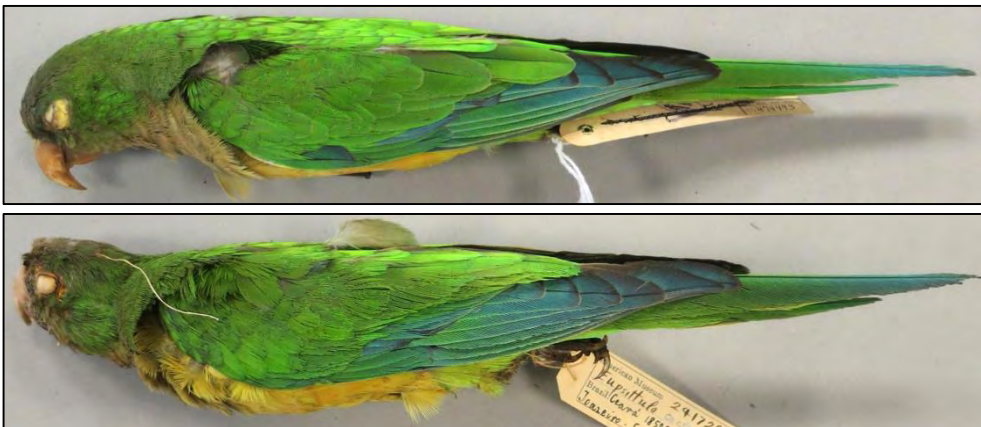


Appendix 12. Photos from top to bottom of *A. c. cactorum* (AMNH474493) and *A. c. caixana* (AMNH241727), showing that there are not marked differences in plumage.

(A) Ventral view.



(B) Lateral view.



Capítulo 3

Morphology, plumage variation and taxonomy of the representatives of the genus *Thectocercus* Ridgway, 1912
(Aves: Psittacidae)

Abstract

The genus *Thectocercus* Ridgway, 1912 includes one polytypic species from South America that has traditionally been included in the broader genus *Aratinga*. In particular, five subspecies have been poorly recognized based on the extension of blue on head and bill coloration. However, since no author has ever revised or compared all proposed subspecies, we performed a taxonomic revision based on plumage and morphometrics. Our analysis revealed the existence of two valid taxa that were considered species according to the Phylogenetic Species Concept, *T. acuticaudatus* and *T. haemorrhous*. On the other hand, *T. a. neoxenus* (Cory, 1909) and *T. a. koenigi* (Arndt, 1995) were considered junior synonyms of *T. haemorrhous* (Spix, 1824), since they all exhibit totally whitish bill, blue restricted to forehead and crown and the same amount of reddish on the underside of tail. Similarly, *T. a. neumanni* (Blake & Traylor, 1947) was considered a junior synonym of *T. acuticaudatus* (Vieillot, 1817), because both taxa exhibit dark mandible; blue on forehead, crown, nape, area around the eye, cheeks, auriculars and greater primary-coverts.

Resumo

O gênero *Thectocercus* Ridgway 1912 inclui uma única espécie politípica da América do Sul que tem sido tradicionalmente incluída no mais amplo gênero *Aratinga* por Peters (1937). Em particular, cinco subespécies pouco diferenciadas foram sugeridas com base na extensão de azul na cabeça e coloração do bico. No entanto, uma vez que nenhum autor tem comparado ou revisado todas as subespécies propostas, foi realizada uma revisão taxonômica com base em plumagem e morfometria. Nossa análise revelou a existência de dois táxons válidos que foram considerados espécies de acordo com o Conceito Filogenético de Espécie, *T. acuticaudatus* e *T. haemorrhous*. Por outro lado, *T. a. neoxenus* (Cory, 1909) e *T. a. koenigi* (Arndt, 1995) foram considerados sinônimos júnior de *T. haemorrhous* (Spix, 1824), uma vez que todos apresentam bico totalmente branco, azul restrito às partes da testa e da coroa e a mesma quantidade de avermelhado na parte inferior da cauda. Da mesma forma, *T. a. neumanni* (Blake & Traylor, 1947) foi considerado um sinônimo júnior de *T. acuticaudatus* (Vieillot, 1817), pois ambos apresentam mandíbula escura; azul em testa, coroa, nuca, área ao redor dos olhos, bochechas, auriculares e grandes coberteiras das asas.

Morphology, plumage variation and taxonomy of the representatives of the genus *Thectocercus* Ridgway, 1912 (Aves: Psittacidae)

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1. INTRODUCTION

The genus *Thectocercus* Ridgway, 1912 belongs to the tribe Arini and currently includes only one species, *T. acuticaudatus*, that occurs in South America (Remsen *et al.* 2013). Most authors have considered *T. acuticaudatus* as a polytypic species belonging to the genus *Aratinga* (Brabourne & Chubb 1912; Peters 1937; Blake & Traylor 1947; Pinto 1978; Arndt 1981; Forshaw 1989; Arndt 1995; Collar 1997; Juniper & Parr 1998; Forshaw 2010). In particular, five subspecies have been poorly recognized based on extension of blue on head and bill coloration, *A. a. acuticaudata*, *A. a. haemorrhous*, *A. a. neoxena*, *A. a. neumanni* and *A. a. koenigi*. They all exhibit mostly green plumage, pointed-tail, white periophthalmic ring, blue on forehead and crown, and reddish underside of tail.

A. a. acuticaudata occurs in eastern Bolivia and southwestern Mato Grosso do Sul, Brazil, to Paraguay, western Uruguay, and north Argentina, south to the provinces of La Pampa and southwestern Buenos Aires (Forshaw 2010). It is diagnosed by a dark mandible (Souancé 1856; Finsch 1867; Leybold 1873; Blake & Traylor 1947; Arndt 1981; Forshaw 2010) and blue head (Arndt 1981; Forshaw 1989; Arndt 1995; Collar 1997; Juniper & Parr 1998; Forshaw 2010). According to Juniper & Parr (1998) it is larger than other races, with bluer head and duller underparts.

A. a. haemorrhous occurs in northeastern Brazil, in the states of Piauí and Bahia (Pinto 1938; Arndt 1981; Forshaw 1989; Arndt 1995; Collar 1997; Juniper & Parr 1998; Forshaw 2010); and it is characterized by whitish bill (Spix 1824; Saint-Hilaire 1838; Souancé 1856; Finsch 1867; Salvadori 1891; Arndt 1981; Forshaw 1989; Arndt 1995; Collar 1997; Forshaw 2010) and blue restricted to forehead and crown (Salvadori 1891; Forshaw 1989). However, some authors stated that blue is confined to forehead (Spix 1824; Saint-Hilaire 1838; Souancé 1856; Collar 1997). Moreover, according to Salvadori (1891), Cory (1909) and Arndt (1981) it presents brighter green plumage.

A. a. neoxena is restricted to Margarita Island (Cory 1909; Brabourne & Chubb 1912; Cory 1918; Collar 1997; Juniper & Parr 1998), while according to some authors (Arndt 1981; Forshaw 2010) it occurs also in northern Venezuela. It differs in being darker than *A. a. haemorrhous* and

exhibiting whitish bill (Cory 1909), bluish-green breast and abdomen (Collar 1997; Juniper & Parr 1998), and dull blue forehead and crown (Cory 1909; Arndt 1981).

A. a. neumanni occurs in the departments of Cochabamba, Santa Cruz, Chuquisiaca and probably Tarija, southern Bolivia (Blake & Traylor 1947; Arndt 1981; Juniper & Parr 1998; Forshaw 2010). It presents dark mandible, blue restricted to forehead, crown and nape (Blake & Traylor 1947; Forshaw 1989; Collar 1997; Juniper & Parr 1998; Forshaw 2010). According to Blake & Traylor (1947), it presents darker plumage than *A. a. haemorrhous* and is larger than *A. a. acuticaudata* and *A. a. haemorrhous*.

A. a. koenigi is found in northeastern Colombia and northern Venezuela (Arndt 1995; Collar 1997; Juniper & Parr 1998; Forshaw 2010); and it is characterized by whitish bill and less brownish-red on underside of tail, being similar to *A. a. haemorrhous* and the smallest race with *A. a. neoxena* (Arndt 1995; Forshaw 2010).

Several taxonomic arrangements have been proposed in the past two centuries. Initially, only two races were recognized, *acuticaudatus* and *haemorrhous*. Some authors have included *acuticaudatus* (Gray 1845; Des Murs 1846; Finsch 1867; Salvadori 1891; Miranda-Ribeiro 1920) and *haemorrhous* (Finsch 1867; Garrod 1874; Salvadori 1891; Miranda-Ribeiro 1920) in the genus *Conurus* and considered them two different species, mainly based on the extension of blue on head. Souancé (1856) and Pinto (1938) placed them in *Psittacara*; whereas in 1857, Souancé grouped them in *Evopsitta*. In 1912, Ridgway described the genus *Thectocercus* based on morphological and plumage characters and designated *Psittacus acuticaudatus* Vieillot, 1817 as the type species. Nevertheless, in the same year Brabourne & Chubb grouped *acuticaudata*, *haemorrhous* and *neoxena* in the genus *Aratinga*. Finally, in 1937, Peters considered these three taxa as subspecies of *Aratinga acuticaudata*.

In the 20th century new races and taxonomic arrangements have been proposed within *A. acuticaudata*, often without justification or detailed comparisons among the taxa. Firstly, Cory (1909) described *Conurus neoxenus*, based on two individuals from Margarita Island (Venezuela), as a new species similar to *haemorrhous*, also with whitish bill, but darker and with dull blue on forehead and crown. Later, in 1918, he considered it a subspecies of *haemorrhous* and grouped it with *acuticaudatus* and *h. haemorrhous* in *Thectocercus*. Secondly, Blake & Traylor (1947) described *neumanni* as a subspecies of *A. acuticaudata* from south Bolivia, characterized by dark mandible and blue restricted to forehead, crown and nape. Lastly, Arndt (1995) described *A. a. koenigi* as a separate race occurring in northeastern Colombia and northern Venezuela, and

presenting less brownish-red on underside of tail. This classification has been followed by all subsequent authors (Collar 1997; Juniper & Parr 1998; Forshaw 2010), until Remsen *et al.* (2013), based on plumage analysis and comparisons with molecular published phylogenies, suggested that *A. acuticaudata* should be placed in the resurrected genus *Thectocercus*; because it exhibits a maxilla laterally swollen, that it is much wider than deep at base, broadly arched in transverse section with an attenuated, acute and ridged tip; narrow feathers on cheeks, naked cere and inner webs of rectrices mostly red. All characters that had been used by Ridgway (1912) to describe the genus *Thectocercus*.

Since 1995, when the last race of *A. acuticaudata* was described, no author has revised or compared all five proposed subspecies. Moreover, molecular studies have included only the nominotypic form. Therefore, this study aims to examine and document morphological variation within *Thectocercus* Ridgway and to perform a taxonomic revision based on morphological and morphometric characters, including all five races suggested in the literature.

2. MATERIALS AND METHODS

A total of 140 skins of *Thectocercus* (Appendix 1) were examined in the following institutions: Museu de Zoologia da Universidade de São Paulo (MZUSP), São Paulo, Brazil; American Museum of Natural History (AMNH), New York, USA; Smithsonian Institution National Museum of Natural History (USNM), Washington, USA; Field Museum of Natural History (FMNH), Chicago, USA; Louisiana Museum of Natural History (LSUMZ), Baton Rouge, USA; Natural History Museum (BMNH), Tring, UK; Muséum National d'Histoire Naturelle (MNHN), Paris, France. Three type specimens were analyzed using high-quality photos: two from the Zoologische Staatssammlung München (ZSM), Munich, Germany; and one from the Senckenberg Museum (SMF), Frankfurt, Germany. Moreover, 13 specimens from the Carnegie Museum of Natural History (MC), Pittsburgh, USA; and 6 from the Museo Argentino de Ciencias Naturales Bernardino Rivadavia (MACN), Buenos Aires, Argentina were also examined using photos.

Measurements and photos were taken for each single specimen analyzed. Also, all information attached to the specimens, such as museum catalogue number, sex, locality, date and collector, was recorded. Plumage coloration was described using the terminology of Smithe (1975) and Forshaw (2010). It is worth noting that bill, periophthalmic ring and tarsus coloration was codified after examination of alive individuals' photos. Measurements of exposed culmen without cere, width at base of bill, tarsu-metatarsus, tail and wing chord were obtained for 119 individuals,

including captured or captive bred birds, since their exclusion did not change analyses results. Measurements were taken with a digital caliper with a precision of 0.05 mm and a ruler (precision 0.5 mm), according to Baldwin *et al.* (1931). Rectrice measurements were discarded due to the large amount of specimens exhibiting damaged tail. Moreover, 16 skeletons of *Thectocercus* (Appendix 2) were analyzed. Those specimens that could not be identified at species level, lacking locality information or being captive birds, were excluded from further analyses. Osteological and morphological characters, described according to Baumel *et al.* (1993) and Sereno (2007), were used to propose a phylogenetic hypothesis for the genus *Aratinga* sensu Peters (1937) (Ferraroni & Silveira in prep.).

In order to assess differences in body size statistical analyses, using a significance level of 0.05, were performed in R 3.0.2 (R Core Team 2013), and included Shapiro-Wilk normality test, Levene's or Fligner-Killeen Test for homogeneity. To test for sexual dimorphism Kruskal-Wallis, Welch's two sample t-test and Wilcoxon test were performed; whereas for morphometric differences we used Kruskal-Wallis or One-way ANOVA, and Wilcoxon rank sum test or Tukey for multiple comparisons between pairs of taxa. Finally, we performed a principal component analysis (PCA) and we tested if morphological variation was related to latitude, as suggested by Blake & Traylor (1947), with both linear and multiple regression models. Prior to PCA analysis, a transformation of initial measurements was performed in order to eliminate the effect of shape and size.

The criterion adopted for identifying and delimiting taxonomic units was diagnosability. Characters were selected to find fully diagnosable clusters of individuals sharing similar morphology. These clusters were, after analysis, considered species following the Phylogenetic Species Concept (Nelson & Platnik 1981; Cracraft 1983, 1987, 1989; McKittrick & Zink 1988).

Characters and specimens locality (obtained for 128 individuals) were mapped using QuantumGIS 2.0.1-Dufour (2013). Geographical coordinates were obtained using ornithological gazetteers (Paynter Jr 1982, 1989, 1992, 1994, 1995, 1997; Paynter Jr & Taylor Jr 1991a, 1991b; Vanzolini 1992) or, when not available in the literature, from the following websites: <http://www.fallingrain.com>, <http://www.geographic.org>, <http://www.maplandia.com> and <http://www.wikimapia.com>. Also, photos found on websites such as <http://wikiaves.com.br> and <http://ibc.lynxeds.com> were used to confirm the current distribution of taxa. Finally, the list of synonyms includes all names considered applicable to the examined taxa after the analysis of morphology. Some vernacular names were included, when used as base for other descriptions.

Moreover, were included erroneously spelled names, changes of combination and changes of taxonomic level. When the same name was cited by more than one author, only the first was included in the list.

3. RESULTS AND DISCUSSION

3.1 Morphological characters

Nineteen out of 30 morphological characters examined (Appendix 3) support the genus *Thectocercus* Ridgway. These characters states were: (1) maxilla: Pale Pinkish Buff 121D, (2) tarsus: Flesh Color 5, (3) periophthalmic ring: white, (4) forehead: Cerulean Blue 67, (5) crown: Cerulean Blue 67, (6) dorsal neck: Parrot Green 60, (7) scapulars: Parrot Green 60, (8) lesser underwing-coverts: Lime Green 159, (9) bend of wing: Parrot Green 60, (10) median wing-coverts: Parrot Green 60, (11) greater secondary-coverts: Parrot Green 60, (12) folded secondaries: Parrot Green 60, (13) rump: Lime Green 159, (14) crural feathers: Lime Green 159, (15) primaries: Parrot Green 60 with distal portion Cerulean Blue 67 and Jet Black 89 edges, (16) secondaries: Parrot Green 60 with distal portion Cerulean Blue 67 and Jet Black 89 edges, (17) underwing-coverts: Grayish Olive 43, (18) upperside of tail: Parrot Green 60 with distal portion Cerulean Blue 67, (19) underside of tail: Grayish Olive 43 and Ferruginous 41.

Moreover, 31 out of the 40 osteological characters (Appendix 4) used to propose a phylogenetic hypothesis for *Aratinga* sensu Peters (1937) (Ferraroni & Silveira in prep.), can be considered diagnostic for the genus *Thectocercus* Ridgway. They are: (1) a short *proc. zygomaticus*, (2) a pointed *proc. lacrimalis*, (3) the lack of an indent on median portion of the *proc. orbitalis* of the lacrimal, (4) the presence of a ridge on *fossa temporalis*, (5) the absence of a deep *fossa temporalis*, (6) *rostrum maxillae* with the shape of an isosceles triangle, (7) the lack of a space between *os maxillare* and *os palatinum*, (8) the *arcus suborbitalis* does not reach the *arcus jugalis*, (9) the *crista nuchalis transversa* joins the *proc. paraoccipitalis*, (10) marked *crista nuchalis transversa*, (11) *crista nuchalis transversa* with the shape of a "M", (12) presence of a ridge on *ala parasphenoidalis*, (13) rounded *proc. medialis mandibulae*, (14) *proc. retroarticularis* with triangular acute shape, (15) rounded *fenestra antorbitalis*, (16) marked foramina in the supraorbital region, (17) lack of contact between the pterygoid and the caudal portion of *os palatinum*, (18) crista of the median portion of the palatine touching the pterygoid, (19) rounded *proc. paraoccipitalis*, (20) notch on *os maxillare*, (21) thin *spina externa rostri*, (21) pointed *apex carinae*, (22) absence of *tuberculum cristae medianae*, (23) the *pila coracoidea* does not present a

“V” shape, (24) *margo caudalis* with triangular shape, (25) a closed *foramen obturatum*, (26) pointed *ala preacetabularis ilii*, (27) not prominent *tuberculum preacetabulare*, (28) a closed *sutura iliosyncralis*, (29) pointed *proc. marginis caudalis*, (30) prominent *tuberculum supracondylare ventrale*, (31) incompletely ossified *pons supratendineus*.

Vieillot’s (1817) original description of *Psittacus acuticaudatus* was based on Azara’s “Maracana cabeza azulada” (1805). Azara, who spent twenty years in South America, said that he saw one single individual collected at 24° south of latitude, in Paraguay, and he highlighted the presence of naked periophthalmic ring, blue head and incarnate on the underside of tail, characteristic of the representants of the genus *Thectocercus*. Few years later, Sonnini (1809) published a french edition of Azara’s expeditions and discoveries, *Voyages dans l’America Meridionale*, where he reported a similar description under the name of “Maracana a tete bleue”. The same description was used by Latham (1822) under the name “Blue-crowned Maccaw”.

Nevertheless, ten years later, Wagler (1832) described *Sittace acuticaudata*, a bird exhibiting white bill and blue forehead, as *T. haemorrhous*, but reported to occur on the Amazon River in Brazil and in Paraguay, range more similar to that of *T. acuticaudatus*. He considered his *S. acuticaudata* the same as Azara’s “Maracana a tete bleue”, *Psittacus acuticaudatus* Vieillot, 1817 and *Aratinga haemorrhous* Spix, 1824. The same classification was followed by Saint Hilaire (1838), who redescribed *Aratinga haemorrhous* Spix, 1824 under the name of *Psittacara caeruleofrontata*, and considered it the same of *Psittacus acuticaudatus* Vieillot, 1817. For the ambiguity of *Sittace acuticaudata*’s description, this name was excluded from the synonyms list.

The first author to place *acuticaudatus* in *Conurus* was Gray (1845), who did not include a description or a justification for his classification; despite Finsch (1867) considered it (together with *C. cyanops* Gray, 1859) a synonym of *Aratinga haemorrhous* Spix, 1824. Due to the lack of a description, *C. acuticaudatus* Gray, 1845 was excluded from the list of synonyms. Des Murs (1846) followed Gray, but interestingly, he stated that Azara’s (1805) description matched with Spix’s (1824) and it referred only to the female of *C. acuticaudatus* Gray 1845, that exhibits blue only on forehead. Moreover, Des Murs assumed that his description, based on a specimen from Argentina that he obtained by D’ Orbigny, referred to the male, that presents blue on the whole head and black mandible (Figure 1).

On the other hand, subsequent authors (Souancé 1856, 1857; Finsch 1867; Salvadori 1891; Brabourne & Chubb 1912; Cory 1918; Miranda-Ribeiro 1920; Peters 1937; Pinto 1938, 1978; Blake & Traylor 1947; Arndt 1981; Forshaw 1989; Arndt 1995; Collar 1997; Juniper & Parr 1998; Forshaw

2010) recognized that *P. acuticaudatus* Vieillot, 1817 differ from *A. haemorrhous* Spix, 1824. In particular, Souancé (1856) considered his *Psittacara acuticaudata* the same as *Conurus acuticaudatus* Des Murs, 1846 and his *Psittacara haemorrhoea* likewise *Sittace acuticaudata*, Wagler 1832; and one year later (1857) he grouped *acuticaudata* and *haemorrhoea* in in the genus *Evopsitta*. Similarly, Finsch (1867) considered his *Conurus acuticaudatus* the same as *Conurus acuticaudatus* Des Murs, 1846.



Figure 1. Des Murs' illustration of *Conurus acuticaudatus* (1846), plate 31, based on *C. acuticaudatus* Gray, 1845.

Furthermore, Gray (1859) redescribed *Psittacus acuticaudatus* Vieillot, 1817 (probably the same he had named *C. acuticaudatus* in 1845) as *Conurus cyanops* based on Des Murs' plate and on a specimen from the Brydges' collection (BMNH1846.9.9.38) from Bolivia. Despite the type specimen of *Psittacus acuticaudatus* Vieillot, 1817 being unavailable since its description was based on Azara's, there are no doubts about its identity and therefore there is no need to designate a neotype (Art. 75.2 of the *International Code of Zoological Nomenclature* 1999).

Our analysis did not support any of the differences in plumage reported in the literature among *A. a. haemorrhous*, *A. a. neoxena* and *A. a. koenigi*. In particular, *haemorrhous* does not exhibit brighter plumage (Salvadori 1891; Cory 1909; Arndt 1981), *neoxena* does not present bluish-green breast and abdomen (Collar 1997; Juniper & Parr 1998), neither duller blue forehead and crown (Cory 1909; Arndt 1981). Finally, *koenigi* does not exhibit less brownish-red on underside of tail (Arndt 1995; Forshaw 2010). Therefore, we here consider *C. neoxenus* Cory, 1909 and *A. a. koenigi* Arndt, 1995 as junior synonyms of *A. haemorrhous* Spix, 1824. In fact, they all

exhibit totally whitish bill, blue restricted to forehead and crown, and the same amount of reddish on the underside of tail (Appendix 5).

Furthermore, we were unable to clearly identify differences in plumage between *A. a. acuticaudata* and *A. a. neumanni*. These races occur sympatrically in Bolivia, where *neumanni* can be found in the south and *acuticaudata* in the east. Nevertheless, even when we included the entire region of Santa Cruz in the range of *A. a. neumanni*, as suggested by some authors (Arndt 1981; Juniper & Parr 1998; Forshaw 2010), we found individuals that exhibit dark mandible; blue on forehead, crown, nape, area around the eyes, cheeks, auriculars, greater primary-coverts; and blue tinge on throat, breast and belly as in *A. a. acuticaudata* (Appendix 6). Thus, from our analysis resulted that *A. a. neumanni* Blake & Traylor, 1947 is not characterized by blue restricted to forehead, crown and nape (Blake & Traylor 1947; Forshaw 1989; Collar 1997; Juniper & Parr 1998; Forshaw 2010), and we here consider it as a junior synonym of *Psittacus acuticaudatus* Vieillot, 1817 (Appendix 7).

Two taxa could be unambiguously diagnosed (Figures 2, 3, 4, 5), and were placed in the genus *Thectocercus* Ridgway, 1912 following Remsen *et al.* (2013), with *Psittacus acuticaudatus* Vieillot, 1817 as the type species. Interestingly, as already pointed out by Hellmayr (1929) and Blake & Traylor (1947), recent records published on Wiki Aves confirmed that in addition to northwestern Mato Grosso do Sul, the two species occur sympatrically in southern Mato Grosso (Czaban 1985; Gregorio 2014; Almeida 2015).

***Thectocercus acuticaudatus* (Vieillot, 1817)**

Maracana cabeza azulada Azara, 1805. Apuntamientos para la Historia Natural de los Pajaros del Paraguay y Rio de la Plata, II, p. 421, n. 278.

Maracana a tete bleue Azara, 1809. Voyages dans l'America Meridionale, III, p. 61.

Psittacus acuticaudatus Vieillot, 1817. Nouveau Dictionnaire, XXV, p. 369. Based on Azara's description. Type specimen missing. Type locality: Paraguay.

Conurus acuticaudatus Des Murs, 1846. Iconographie Ornithologique, pl. 31.

Conurus modestus Lichtenstein, 1854. Nomenclator avium Musei Zoologici Berolinensis. Namenverzeichniss, p. 73.

Psittacara acuticaudata Souancé, 1856. Revue et Magasin de Zoologie pure et appliquée, p.58.

Evopsitta acuticaudata Souancé, 1857. Iconographie des Perroquets, pl. iv.

Conurus cyanops Gray, 1859. List of the Specimens of Birds in the British Museum, III, p. 33. Type:

BMNH1846.9.9.38, Bolivia, Bridges.

Conurus acuticaudatus - Finsch, 1867. Die Papagaien, monographisch bearbeitet, I, p. 453.

Conurus glaucifrons Leybold, 1873. Leopoldina, Heft viii. n° 7, p. 52.

Conurus acuticaudatus - Salvadori, 1891. Catalogue of the Birds of the British Museum, XX, p. 174.

Aratinga acuticaudata Brabourne & Chubb, 1912. The Birds of South America, I, p. 80, n°746.

Thectocercus acuticaudatus Cory, 1918. Catalogue of the birds of the Americas, XIII, p. 60.

Conurus acuticaudatus - Miranda-Ribeiro, 1920. Revista do Museu Paulista, XII, p. 8.

Thectocercus acuticaudatus acuticaudatus Hellmayr, 1929. Field Museum of Natural History Publication 255, XII, No. 18. A Contribution to the Ornithology of Northeastern Brazil, p. 439.

Aratinga acuticaudata acuticaudata Peters, 1937. Checklist of the birds of the world, III, p. 185.

Psittacara acuticaudata acuticaudata Pinto, 1938. Catalogo das aves do Brasil. Primeira parte, p. 186.

Aratinga acuticaudata acuticaudata - Blake & Traylor, 1947. Fieldiana Zoology, XXXI, n°21, p. 166.

Aratinga acuticaudata neumanni Blake & Traylor, 1947. Fieldiana Zoology, XXI, n°21. p. 166.

Type: FMNH179076, Bolivia, Santa Cruz, Comarapa, 15.x.1926, Steinbach.

Diagnosis: diagnosed by dark mandible (True Cinnamon 139), blue (Cerulean Blue 67) forehead, crown, area around the eye, cheeks, auriculars, and upper throat. Nape is blue (Cerulean Blue 67) and green (Parrot Green 60). Throat, breast and belly are mainly light green (Lime Green 159) with blue (Cerulean Blue 67) tinge. Greater primary-coverts are green (Parrot Green 60) and blue (Cerulean Blue 67).

Distribution: occurs in eastern and southern Bolivia; southern Mato Grosso, northwestern Mato Grosso do Sul, Brazil; Paraguay; western Uruguay; and north Argentina, south to the provinces of La Pampa and southwestern Buenos Aires.

***Thectocercus haemorrhous* (Spix, 1824)**

Aratinga haemorrhous Spix, 1824. Avium Species Novae, I, p. 29. Syntypes: ZSMB29, ZSMB29a, Campo Alegre, Bahia.

Psittacara caeruleofrontata Bourjot Saint-Hilaire, 1838. Histoire Naturelle des Perroquets, pl. 17.

Psittacara haemorrhous Bonaparte, 1856. Naumannia, VI, Tabellarische Uebersicht der

Papagaien, in Beilage n°1, n°18.

Psittacara haemorrhoea Souancé, 1856. Revue et Magasin de Zoologie pure et appliquée, p. 58.

Evopsitta haemorrhoea Souancé, 1857. Iconographie des Perroquets, pl. iv.

Conurus haemorrhous Finsch, 1867. Die Papagaien, monographisch bearbeitet, I, p. 453.

Conurus haemorrhous Garrod, 1874. Proceedings of the Scientific Meetings of the Zoological Society of London, IV, p. 587.

Conurus haemorrhous - Salvadori, 1891. Catalogue of the Birds of the British Museum, XX, p. 173.

Conurus neoxenus Cory, 1909. The birds of the Leeward Islands, Caribbean Sea. Field Museum of Natural History. Publication n° 137, I, N°5, p. 243. Type: FMNH37454, Venezuela, Margarita Island, Boca del Rio, 11.iii.1909, J. F. Ferry.

Aratinga haemorrhous Brabourne & Chubb, 1912. The Birds of South America, I, p. 80, n°746.

Aratinga neoxenus Brabourne & Chubb, 1912. The Birds of South America, I, p. 80, n°746.

Thectocercus haemorrhous haemorrhous Cory, 1918. Catalogue of the Birds of the Americas, XIII, p. 60.

Thectocercus haemorrhous neoxenus Cory, 1918. Catalogue of the Birds of the Americas, XIII, p. 60.

Conurus haemorrhous - Miranda-Ribeiro, 1920. Revista do Museu Paulista, XII, p. 8.

Thectocercus acuticaudatus haemorrhous Hellmayr, 1929. Field Museum of Natural History Publication 255, XII, No. 18. A Contribution to the Ornithology of Northeastern Brazil, p. 439.

Aratinga acuticaudata haemorrhous Peters, 1937. Checklist of the Birds of the World, III, p. 185.

Aratinga acuticaudata neoxena Peters, 1937. Checklist of the Birds of the World, III, p. 185.

Psittacara acuticaudata haemorrhous Pinto, 1938. Catalogo das aves do Brasil. Primeira parte, p. 186.

Aratinga acuticaudata haemorrhous - Blake & Traylor, 1947. Fieldiana Zoology, XXXI, n°21. p. 166.

Aratinga acuticaudata koenigi Arndt, 1995. Lexicon Parrots, III, Pt 7, n°221. Holotype: SMF25817, Quiribana de Caicara, Venezuela, T. Arndt.

Diagnosis: characterized by totally whitish (Pale Pinkish Buff 121D) bill and blue (Cerulean Blue 67) restricted to forehead and crown.

Distribution: occurs in northeastern Colombia, northern Venezuela, Margarita Island; and in the Brazilian states of Piauí, Bahia, southern Mato Grosso and Mato Grosso do Sul.



Figure 2. Dorsal view of the 2 species of *Thectocercus*, from the top to the bottom: *T. acuticaudatus* (Vieillot, 1817) AMNH474311 and *T. haemorrhous* (Spix, 1824) AMNH241664. They both exhibit blue forehead and crown; green dorsal neck, scapulars, folded secondaries; and upperside of tail mainly green with blue edges.

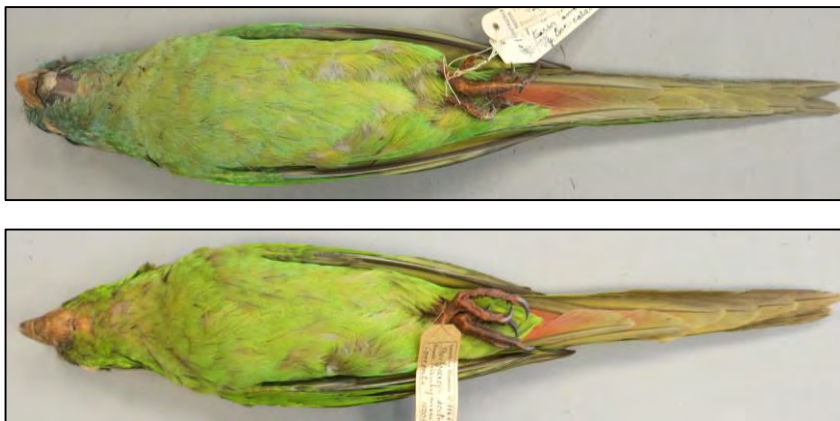


Figure 3. Frontal view of the 2 species of *Thectocercus*, from the top to the bottom: *T. acuticaudatus* (Vieillot, 1817) AMNH474311 and *T. haemorrhous* (Spix, 1824) AMNH241664. They both present light green crural feathers, flesh color tarsus and underside of tail mainly grayish-olive with reddish.

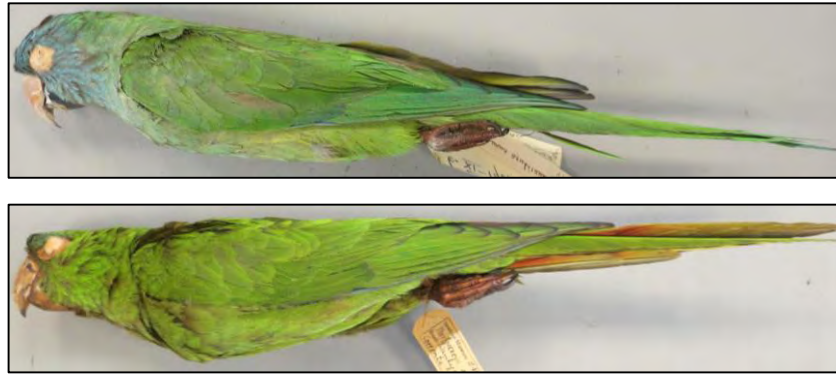


Figure 4. Lateral view of the 2 species of *Thectocercus*, from the top to the bottom: *T. acuticaudatus* (Vieillot, 1817) AMNH474311 and *T. haemorrhous* (Spix, 1824) AMNH241664. They both exhibit white periphthalmic ring; green bend of wing, lesser wing-coverts, median wing-coverts and greater secondary-coverts; primaries and secondaries mainly green with distal portion blue and black edges.

3.2 Morphometric analyses

All analyses were performed first with the five taxa reported in the literature (Appendix 8) and second with the two species here proposed. Here are reported only results after the taxonomic revision. Data regarding exposed culmen without cere (p-value = 0.019) and tarsus (p-value= 0.011) were not normally distributed, since the p-value in the Shapiro-Wilk test resulted to be less than the chosen alpha level (0.05), therefore a non-parametric Fligner-Killeen test was performed. On the other hand, width at base of bill and wing length data were normally distributed, thus parametric tests were selected. The Fligner-Killeen and Levene's tests reported that all variances were homogeneous. A Mann–Whitney U test, a non-parametric test performed to test for sexual dimorphism in culmen and tarsus between the two taxa, reported significant differences in exposed culmen (p-value < 0.0001); particularly, culmen seems to be longer in males (*T. acuticaudatus*: p-value= 0.006, *T. haemorrhous*: p-value= 0.033).

Significant morphometric differences were found in the Mann–Whitney U test for tarsus, and in the t-test for wing and width at base of bill (Table 1). *T. acuticaudatus* presents wider bill and slightly longer wing than *haemorrhous*, whereas *T. haemorrhous* exhibits longer tarsus (Table 2). In the principal component analysis (PCA) the first two principal components explained 66% of the variance between all taxa (Eigenvalue—66.03%). Particularly, the first component (38.54 %) refers to culmen and tarsus length; while the second (27.49%) refers to width at base of bill and culmen length. As we can see in the graph (Figure 6), the PCA showed overlap between the two species. Finally, regression models were performed to test for a possible relation between

morphometric variation and latitude, since Blake & Traylor (1947) suggested that the representants of the genus *Thectocercus* Ridgway could exhibit a steady increase in size from north to south. The multiple regression model, including all morphometric variables (culmen, width, wing and tarsus), reported an adjusted R-squared of 0.3522 (a modified version of R-squared that has been adjusted for the number of predictors in the model) and a significant (< 0.05) p-value for all morphometric variables. Particularly, the variable that seems to be more related to latitude is wing length (p-value < 0.0001), that decreases as latitude increases (Appendix 9). Moreover, linear regression models also reported an inverse correlation in width at base of bill, whereas a slightly positive correlation in culmen and tarsus length. Nevertheless, there seems to be no overall positive correlation between morphometric variation and latitude.

Table 1. Mann–Whitney U test (Tarsus and Culmen) and t-test (Width at base of bill and Wing) for 4 morphometric parameters. Ns = no significant difference; <0.05 = significant difference.

Taxa	Culmen	Width	Wing	Tarsus
<i>acuticaudatus - haemorrhous</i>	Ns	< 0.0001	<0.05	< 0.0001

Table 2. Morphological measurements (mm) as mean and standard deviation (first row) and minimum and maximum values (second row) for male and female of each the two recognized taxa.

Taxa	Bill width M	Bill width F	Culmen M	Culmen F	Wing M	Wing F	Tarsus M	Tarsus F
<i>acuticaudatus</i>	16.62±0.74 (15.62-18.63)	16.39±0.68 (15.28-18.54)	27.78±1.27 (25.21-30.94)	26.96±1.40 (25.20-31.59)	190.8±7.38 (178-208)	187.1±7.28 (176-203)	17.09±0.90 (15.01-18.88)	17.46±1.03 (15.43-19.10)
<i>haemorrhous</i>	16.18±0.82 (14.51-17.98)	15.92±1.02 (13.22-17.30)	28.20±1.86 (24.55-33.75)	27.19±1.39 (22.99-29.66)	184±8.20 (166-198)	185.4±7.16 (171-196)	18.89±0.89 (16.87-20.29)	18.86±1.15 (15.89-20.27)

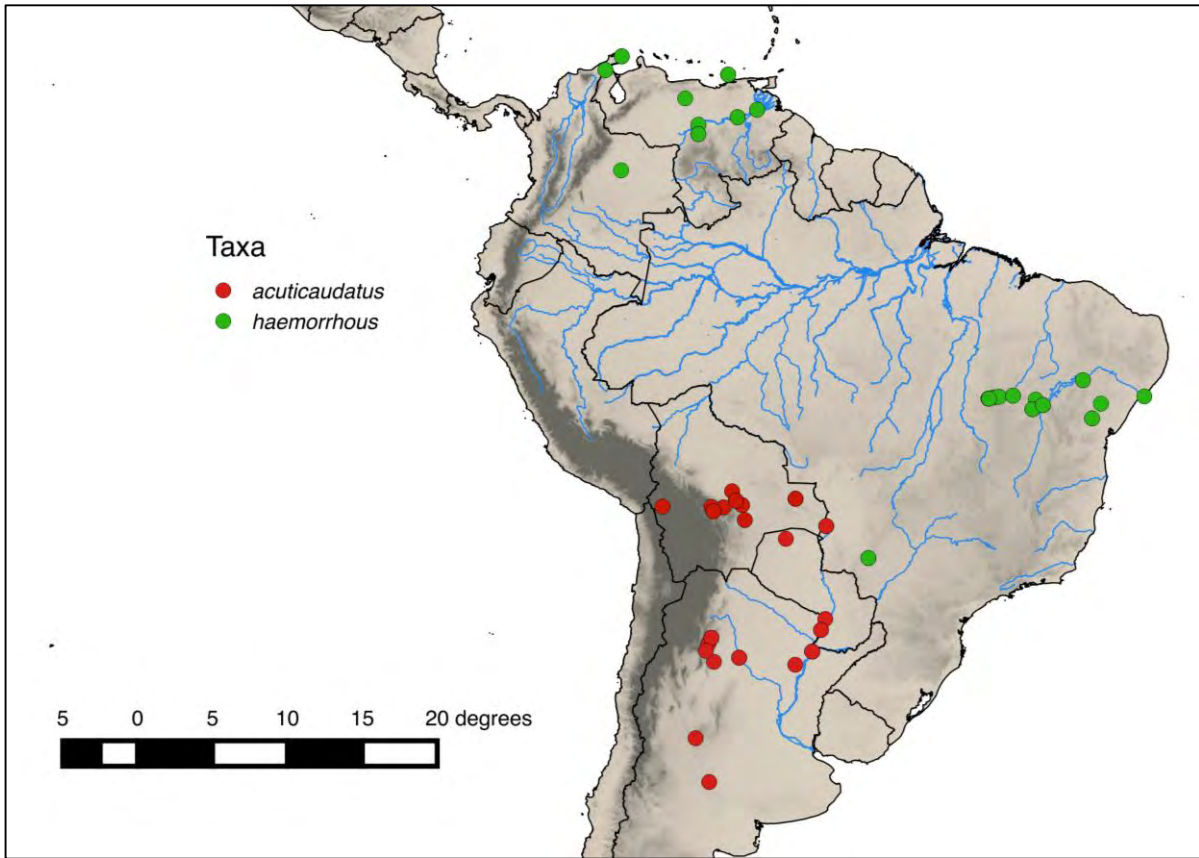


Figure 5. Distribution of analyzed specimens of *Thectocercus* with locality information on label. Red: *T. acuticaudatus* and green: *T. haemorrhous*.

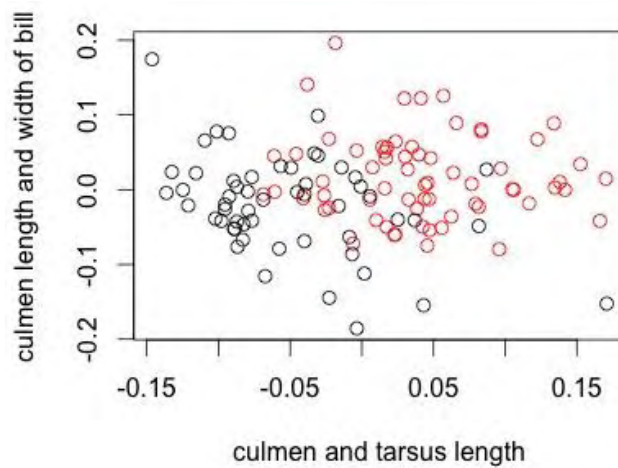


Figure 6. Results of the principal component analysis (Eigenvalue-66.03%). Red: *T. acuticaudatus*, black: *T. haemorrhous*.

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APPENDICES

Appendix 1. List of examined specimens, where “NA” indicates missing information.

Taxon	Number	Sex	Country	State/Region	Locality
<i>acuticaudatus</i>	MACN4320	M	Argentina	NA	Salta
<i>acuticaudatus</i>	MACN8990	M	Argentina	General Roca	Cordoba
<i>acuticaudatus</i>	MZUSP3937	M	Argentina	NA	San Luís
<i>acuticaudatus</i>	AMNH474309	F	Argentina	Tucuman	Bosque
<i>acuticaudatus</i>	MACN2248a	M	Argentina	Formosa	Comandante Fontana
<i>acuticaudatus</i>	MACN2530a	F	Argentina	Salta	Macapillo
<i>acuticaudatus</i>	AMNH474316	F	Argentina	Tucuman	NA
<i>acuticaudatus</i>	AMNH474311	M	Argentina	Tucuman	Tapia
<i>acuticaudatus</i>	AMNH140637	M	Argentina	Santiago del Estero	Lavalle
<i>acuticaudatus</i>	AMNH474310	M	Argentina	Tucuman	Tapia
<i>acuticaudatus</i>	AMNH140631	M	Argentina	Santiago del Estero	Suncho Corral
<i>acuticaudatus</i>	AMNH140634	M	Argentina	Santiago del Estero	Suncho Corral
<i>acuticaudatus</i>	AMNH140632	M	Argentina	Santiago del Estero	Suncho Corral
<i>acuticaudatus</i>	USNM283746	M	Argentina	182 km from Formosa	Riacho Pilaga
<i>acuticaudatus</i>	USNM283745	M	Argentina	Pampa	Victorica
<i>acuticaudatus</i>	USNM283747	M	Argentina	182 km from Formosa	Riacho Pilaga

<i>acuticaudatus</i>	USNM284858	F	Argentina	Tucuman	Tapia
<i>acuticaudatus</i>	USNM284837	F	Argentina	Tucuman	Tapia
<i>acuticaudatus</i>	LSUMZ54051	F	Argentina	Corrientes	San Luis del Palmar. Ea. Garabata'
<i>acuticaudatus</i>	LSUMZ54058	M	Argentina	Corrientes	San Luis del Palmar. Ea. Garabata'
<i>acuticaudatus</i>	LSUMZ54057	F	Argentina	Corrientes	San Luis del Palmar. Ea. Garabata'
<i>acuticaudatus</i>	LSUMZ54050	F	Argentina	Corrientes	San Luis del Palmar. Ea. Garabata'
<i>acuticaudatus</i>	LSUMZ54054	F	Argentina	Corrientes	San Luis del Palmar. Ea. Garabata'
<i>acuticaudatus</i>	LSUMZ54055	M	Argentina	Corrientes	San Luis del Palmar. Ea. Garabata'
<i>acuticaudatus</i>	LSUMZ54052	M	Argentina	Corrientes	San Luis del Palmar. Ea. Garabata'
<i>acuticaudatus</i>	LSUMZ54047	M	Argentina	Corrientes	San Luis del Palmar. Ea. Garabata'
<i>acuticaudatus</i>	LSUMZ54049	F	Argentina	Corrientes	San Luis del Palmar. Ea. Garabata'
<i>acuticaudatus</i>	LSUMZ54056	F	Argentina	Corrientes	San Luis del Palmar. Ea. Garabata'
<i>acuticaudatus</i>	LSUMZ54046	M	Argentina	Corrientes	San Luis del Palmar. Ea. Garabata'
<i>acuticaudatus</i>	LSUMZ54048	M	Argentina	Corrientes	San Luis del Palmar. Ea. Garabata'
<i>acuticaudatus</i>	LSUMZ54053	F	Argentina	Corrientes	San Luis del Palmar. Ea. Garabata'
<i>acuticaudatus</i>	NMHN244	F	Argentina	NA	Mocovi
<i>acuticaudatus</i>	NMHN242	NA	Argentina	Tucuman	Santa Ana
<i>acuticaudatus</i>	NMHN243	NA	NA	NA	NA
<i>acuticaudatus</i>	USNM390721	F	NA	NA	NA
<i>acuticaudatus</i>	FMNH64349	M	Brazil	Mato Grosso do Sul	Urucum de Corumba
<i>acuticaudatus</i>	FMNH64348	F	Brazil	Mato Grosso do Sul	Urucum de Corumba
<i>acuticaudatus</i>	FMNH64347	F	Brazil	Mato Grosso do Sul	Urucum de Corumba
<i>haemorrhous</i>	FMNH110555	F	Brazil	Mato Grosso do Sul	Vaccaria. faz.Capão Bonita
<i>haemorrhous</i>	FMNH110554	M	Brazil	Mato Grosso do Sul	Vaccaria. faz.Capão Bonita
<i>haemorrhous</i>	FMNH110556	M	Brazil	Mato Grosso do Sul	Vaccaria. faz.Capão Bonita
<i>acuticaudatus</i>	FMNH152321	M	Paraguay	Chaco	NA
<i>acuticaudatus</i>	FMNH152835	M	Paraguay	Chaco	Guachalla. Rio Pilcomayo
<i>acuticaudatus</i>	BMNH1846.9.9.38	NA	Bolivia	NA	NA
<i>acuticaudatus</i>	AMNH474328	F	Bolivia	Province of Sara	NA
<i>neumanni</i>	FMNH179076	M	Bolivia	Santa Cruz	Comarapa
<i>neumanni</i>	LSUMZ168728	M	Bolivia	Santa Cruz	Mina Don Mario. 12.6 km ENE San José de Chiquitos
<i>neumanni</i>	LSUMZ37251	M	Bolivia	Santa Cruz	Buena Vista. Ischilo. 400 m
<i>neumanni</i>	LSUMZ168721	M	Bolivia	Santa Cruz	Mina Don Mario. 12,6 km ENE S. José de Chiquitos

<i>neumanni</i>	LSUMZ168729	M	Bolivia	Santa Cruz	Mina Don Mario. 12.6 km ENE San José de Chiquitos
<i>neumanni</i>	LSUMZ168726	F	Bolivia	Santa Cruz	Mina Don Mario. 12.6 km ENE San José de Chiquitos
<i>neumanni</i>	LSUMZ168727	M	Bolivia	Santa Cruz	Mina Don Mario. 12.6 km ENE San José de Chiquitos
<i>neumanni</i>	LSUMZNMK1793	F	Bolivia	Santa Cruz	Mina Don Mario. 12.6 km ENE San José de Chiquitos
<i>neumanni</i>	LSUMZNMK1775	F	Bolivia	Santa Cruz	Mina Don Mario. 12.6 km ENE San José de Chiquitos
<i>neumanni</i>	LSUMZNMK1794	F	Bolivia	Santa Cruz	Mina Don Mario. 12.6 km ENE San José de Chiquitos
<i>neumanni</i>	MACN8972	M	Bolivia	Santa Cruz	Buenavista
<i>neumanni</i>	MACN37489	F	Bolivia	Santa Cruz	Buena Vista
<i>neumanni</i>	CMP32773	NA	Bolivia	Santa Cruz	Santa Cruz
<i>neumanni</i>	CMP32776	NA	Bolivia	Santa Cruz	Santa Cruz
<i>neumanni</i>	CMP32779	NA	Bolivia	Santa Cruz	Santa Cruz
<i>neumanni</i>	CMP43594	NA	Bolivia	Santa Cruz	Santa Cruz
<i>neumanni</i>	CMP43612	NA	Bolivia	Santa Cruz	Santa Cruz
<i>neumanni</i>	CMP51432	NA	Bolivia	Santa Cruz	Buena Vista
<i>neumanni</i>	CMP51433	NA	Bolivia	Santa Cruz	Buena Vista
<i>neumanni</i>	CMP51434	NA	Bolivia	Santa Cruz	Buena Vista
<i>neumanni</i>	CMP51436	NA	Bolivia	Santa Cruz	Buena Vista
<i>neumanni</i>	CMP120044	NA	Bolivia	Santa Cruz	Buena Vista. Rio Surutu
<i>neumanni</i>	CMP51435	NA	Bolivia	Santa Cruz	Buena Vista
<i>neumanni</i>	LSUMZ35772	M	Bolivia	Santa Cruz	Buena Vista. Ischilo. 400 m
<i>neumanni</i>	LSUMZ171164	F	Bolivia	Santa Cruz	Cordillera 38 km E Abapo'
<i>neumanni</i>	LSUMZ37252	M	Bolivia	Santa Cruz	Buena Vista. Ischilo. 400 m
<i>neumanni</i>	CMP120045	NA	Bolivia	Santa Cruz	Buena Vista. Rio Surutu
<i>neumanni</i>	FMNH179085	M	Bolivia	Santa Cruz	Cercado. 450 m
<i>neumanni</i>	FMNH179087	F	Bolivia	Santa Cruz	Buenavista
<i>neumanni</i>	FMNH179086	F	Bolivia	Santa Cruz	Buenavista
<i>neumanni</i>	LSUMZ123504	M	Bolivia	Santa Cruz	Caballero. 2.5 km N Tambo. Rio San Isidro (Rio Pulquina). 1525 m
<i>neumanni</i>	FMNH179073	NA	Bolivia	NA	NA
<i>neumanni</i>	FMNH179084	F	Bolivia	NA	NA
<i>neumanni</i>	AMNH139075	M	Bolivia	Cochabamba	Tujma
<i>neumanni</i>	CMP120166	NA	Bolivia	Santa Cruz	Comarapa
<i>neumanni</i>	FMNH179084	M	Bolivia	Cochabamba	Aiquile. 2150 m
<i>neumanni</i>	FMNH179079	F	Bolivia	Santa Cruz	Comarapa
<i>neumanni</i>	FMNH179075	M	Bolivia	Santa Cruz	Comarapa

<i>neumanni</i>	FMNH179076	M	Bolivia	Santa Cruz	Comarapa
<i>neumanni</i>	FMNH179074	M	Bolivia	Santa Cruz	Comarapa
<i>neumanni</i>	FMNH179082	F	Bolivia	Cochabamba	Aiquile. 2150 m
<i>neumanni</i>	FMNH179078	M	Bolivia	Cochabamba	Aiquile. 2150 m
<i>neumanni</i>	FMNH179081	F	Bolivia	Cochabamba	Aiquile. 2150 m
<i>neumanni</i>	NMHN211	M	Bolivia	Cochabamba	Aiquile. 2150 m
<i>neoxenus</i>	FMNH37454	M	Venezuela	Margarita Island	Boca del Rio
<i>neoxenus</i>	FMNH39136	F	Venezuela	Nueva Esparta	Margarita Island. Boca del Rio
<i>neoxenus</i>	AMNH325206	M	Venezuela	Caracas	Boca del Rio Margarita
<i>haemorrhous</i>	MZUSP11336	M	Brazil	NA	NA
<i>haemorrhous</i>	AMNH474336	F	captivity	NA	NA
<i>haemorrhous</i>	AMNH156468	F	captivity	NA	NA
<i>haemorrhous</i>	AMNH96544	M	captivity	NA	NA
<i>haemorrhous</i>	USNM190312	F	captivity	NA	NA
<i>haemorrhous</i>	ZSM B29	NA	Brazil	Bahia	Campo Alegre
<i>haemorrhous</i>	ZSM B29a	NA	Brazil	Bahia	Campo Alegre
<i>haemorrhous</i>	MZUSP79513	F	Brazil	Tocantins	ESEC Serra Geral do Tocantins
<i>haemorrhous</i>	MZUSP79514	F	Brazil	Tocantins	ESEC Serra Geral do Tocantins
<i>haemorrhous</i>	MZUSP79515	M	Brazil	Tocantins	ESEC Serra Geral do Tocantins
<i>haemorrhous</i>	MZUSP79516	NA	Brazil	Tocantins	ESEC Serra Geral do Tocantins
<i>haemorrhous</i>	MZUSP79517	F	Brazil	Tocantins	ESEC Serra Geral do Tocantins
<i>haemorrhous</i>	MZUSP79518	M	Brazil	Tocantins	ESEC Serra Geral do Tocantins
<i>haemorrhous</i>	MZUSP79519	F	Brazil	Tocantins	ESEC Serra Geral do Tocantins
<i>haemorrhous</i>	MZUSP79520	M	Brazil	Tocantins	ESEC Serra Geral do Tocantins
<i>haemorrhous</i>	MZUSP7319	M	Brazil	Bahia	Juazeiro
<i>haemorrhous</i>	MZUSP40848	F	Brazil	Bahia	Buritirama. Mun. de Barra
<i>haemorrhous</i>	MZUSP40849	M	Brazil	Bahia	Santa Rita de Cassia. Rio Preto
<i>haemorrhous</i>	MZUSP40850	F	Brazil	Bahia	Santa Rita de Cassia. Rio Preto
<i>haemorrhous</i>	MZUSP40851	F	Brazil	Bahia	Barra. Rio Sao Francisco
<i>haemorrhous</i>	AMNH241668	M	Brazil	Bahia	Santa Rita
<i>haemorrhous</i>	AMNH241658	M	Brazil	Bahia	Barra
<i>haemorrhous</i>	AMNH241663	M	Brazil	Piaui	Corrente
<i>haemorrhous</i>	AMNH241666	M	Brazil	Bahia	Santa Rita
<i>haemorrhous</i>	AMNH404	M	Brazil	Piaui	NA
<i>haemorrhous</i>	AMNH241662	F	Brazil	Bahia	Barra
<i>haemorrhous</i>	AMNH241661	F	Brazil	Bahia	Barra
<i>haemorrhous</i>	AMNH241664	F	Brazil	Piaui	Corrente
<i>haemorrhous</i>	USNM264607	M	Brazil	Bahia	Juazeiro

<i>haemorrhous</i>	FMNH46975	M	Brazil	Bahia	Queimadas. Rio do Peixe
<i>koenigi</i>	SMF25817	M	Venezuela	Bolivar	Quiribana de Caicara
<i>koenigi</i>	FMNH298007	F	Colombia	Meta	Carimagua
<i>koenigi</i>	USNM351888	M	Venezuela	NA	El Sombrero
<i>koenigi</i>	USNM388470	F	Venezuela	Caicara	Carapaico
<i>koenigi</i>	USNM368662	M	Colombia	NA	Nazareth. Serrania de Macuire
<i>koenigi</i>	USNM368659	M	Colombia	NA	Nazareth. Serrania de Macuire
<i>koenigi</i>	USNM368658	M	Colombia	La Guajira	Carraipia
<i>koenigi</i>	USNM368660	F	Colombia	NA	Nazareth. Serrania de Macuire
<i>koenigi</i>	USNM368661	M	Colombia	NA	Nazareth. Serrania de Macuire
<i>koenigi</i>	USNM368657	F	Colombia	Carraipia	Guajira
<i>koenigi</i>	AMNH474335	M	Venezuela	Bolivar	Ciudad Bolivar
<i>koenigi</i>	AMNH474332	M	Venezuela	NA	Quiribana de Caicara
<i>koenigi</i>	AMNH474333	M	Venezuela	NA	Quiribana de Caicara
<i>koenigi</i>	AMNH177095	M	Venezuela	Cedeno	Caicara. Orinoco River
<i>koenigi</i>	AMNH177096	F	Venezuela	Cedeno	Caicara. Orinoco River
<i>koenigi</i>	AMNH177092	M	Venezuela	Bolivar	Ciudad Bolivar
<i>koenigi</i>	AMNH474331	M	Venezuela	NA	Quiribana de Caicara
<i>koenigi</i>	AMNH177091	M	Venezuela	Bolivar	Ciudad Bolivar

Appendix 2. List of analyzed skeletons, where “NA” indicates missing information and “complex” those specimens that could not be identified at species level.

Taxon	N°	sex	observations	Locality/Donor
<i>acuticaudatus</i> complex	BMNH1872.7.10.3	NA	captivity	Zoological Society London
<i>a. haemorrhous</i>	BMNH1869.12.22.6	NA	captivity	Zoological Society London
<i>acuticaudatus</i> complex	BMNHs/1955.5.47	NA	captivity	Paraguay. Rothschild
<i>acuticaudatus</i> complex	BMNHs/1994.51.1	NA	captivity	M. Walker
<i>a. acuticaudatus</i>	USNM227478	M	trunk	Formosa, Argentina. Km 182
<i>a. acuticaudatus</i>	USNM227548	M	trunk	Victorica, Pampa argentina
<i>a. acuticaudatus</i>	USNM227773	F		Tucuman, Tapia. Argentina
<i>acuticaudatus</i> complex	AMNH1398	NA		NA
<i>a. acuticaudatus</i>	AMNH6907	M		Argentina, Formosa: 14 km, NW Espinillo
<i>acuticaudatus</i> complex	MZUSP90355	NA		NA
<i>acuticaudatus</i> complex	LSUMZ148709	F	captivity	Glen Smart Aviary, Cape Girardeau, Missouri
<i>acuticaudatus</i> complex	LSUMZ136503	M	captivity	Noah's Pet Shop, Baton Rouge, Louisiana

<i>a. neumanni</i>	LSUMZ125695	M		Dpto. Santa Cruz, Prov. Caballero, 25 km N Tambo, Rio San Isidro, Rio Pulquina Valley, 1500 m
<i>acuticaudatus</i> complex	LSUMZ68719	M	captivity	Dallas Zoo
<i>a. koenigi</i>	FMNH298007	F		Carimagua, Meta, Colombia
<i>acuticaudatus</i> complex	FMNH337762	M	captivity	Busch Gardens

Appendix 3. Morphological characters examined for species of the genus *Thectocercus*, coded according to the catalogue of Smithe.

Character	<i>T. acuticaudatus</i>	<i>T. haemorrhous</i>
Maxilla	Pale Pinkish Buff 121D	Pale Pinkish Buff 121D
Mandible	True Cinnamon 139	Pale Pinkish Buff 121D
Tarsus	Flesh Color 5	Flesh Color 5
Periophthalmic ring	white	white
Area around eye	Cerulean Blue 67	Cerulean Blue 67 and Parrot Green 60
Forehead	Cerulean Blue 67	Cerulean Blue 67
Crown	Cerulean Blue 67	Cerulean Blue 67
Nape	Cerulean Blue 67 and Parrot Green 60	Parrot Green 60
Cheeks	Cerulean Blue 67	Parrot Green 60
Auriculars	Cerulean Blue 67	Parrot Green 60
Upper throat	Cerulean Blue 67	Lime Green 159
Throat	Lime Green 159 with some Cerulean Blue 67	Lime Green 159
Dorsal neck	Parrot Green 60	Parrot Green 60
Scapulars	Parrot Green 60	Parrot Green 60
Lesser underwing-coverts	Lime Green 159	Lime Green 159
Bend of wing	Parrot Green 60	Parrot Green 60
Lesser wing-coverts	Parrot Green 60	Parrot Green 60
Median wing-coverts	Parrot Green 60	Parrot Green 60
Gr. Primary coverts	Parrot Green 60 and Cerulean Blue 67	Parrot Green 60
Gr. Secondary coverts	Parrot Green 60	Parrot Green 60
Folded secondaries	Parrot Green 60	Parrot Green 60
Rump	Lime Green 159	Lime Green 159
Breast	Lime Green 159 with tinge of Cerulean Blue 67	Lime Green 159
Belly	Lime Green 159 with tinge of Cerulean Blue 67	Lime Green 159
Crural feathers	Lime Green 159	Lime Green 159

Character	<i>T. acuticaudatus</i>	<i>T. haemorrhous</i>
Primaries	Parrot Green 60 with Cerulean Blue 67 and Jet Black 89 edges	Parrot Green 60 with Cerulean Blue 67 and Jet Black 89 edges
Secondaries	Parrot Green 60 with Cerulean Blue 67 and Jet Black 89 edges	Parrot Green 60 with Cerulean Blue 67 and Jet Black 89 edges
Underwing-coverts	Grayish Olive 43	Grayish Olive 43
Uppertail	Parrot Green 60 with Cerulean Blue 67	Parrot Green 60 with Cerulean Blue 67
Undertail	Grayish Olive 43 and Ferruginous 41	Grayish Olive 43 and Ferruginous 41

Appendix 4. List of osteological characters examined and reference to the author, when the character was taken from the literature.

Character	Character state	Author
orbit	complete/incomplete	Machado <i>et al.</i> 2006, Alvarenga 2007, Tokita 2003, Tokita <i>et al.</i> 2007
<i>proc. zygomaticus</i> length	short/medium	Machado <i>et al.</i> 2006, Gaban-Lima 2007
<i>proc. zygomaticus</i> shape	rounded/pointed	
<i>proc. lacrimalis</i> shape	rounded/pointed	
ridge on <i>fossa temporalis</i>	present/absent	
deep <i>fossa temporalis</i>	present/absent	
marked foramina in the supraorbital region	present/absent	
marked <i>crista nuchalis transversa</i>	present/absent	
<i>crista nuchalis transversa</i> shape	M/reverse U	Brito 2008
<i>crista nuchalis transversa</i> reaching the <i>proc. paraoccipitalis</i>	present/absent	
<i>proc. paraoccipitalis</i> shape	rounded/pointed	Brito 2008
ridge on <i>ala parasphenoidalis</i>	present/absent	
<i>arcus suborbitalis</i> touching the <i>arcus jugalis</i>	present/absent	
<i>fenestra antorbitalis</i> shape	rounded/triangular	
lacrimal almost closing the antorbital fenestra	present/absent	
<i>rostrum maxillae</i> shape	isosceles triangle/equilateral triangle	
<i>proc. retroarticularis</i> shape	triangular obtuse/triangular acute	Gaban-Lima 2007
indent on median portion of the <i>proc. orbitalis</i> of the lacrimal	present/absent	Brito 2008
<i>foramen pneumaticum palatini</i> size	small/large	

Character	Character state	Author
space between <i>os maxillare</i> and <i>os palatinum</i>	present/absent	
notch on region of the <i>os maxillare</i>	present/absent	
contact region between the pterygoid and caudal portion of <i>os palatinum</i>	present/absent	
crista of the median portion of <i>os palatinum</i> touching the pterygoid	present/absent	
<i>fenestra caudalis mandibulae</i> presence	present/absent	Gaban-Lima 2007
<i>fenestra rostralis mandibulae</i> presence	present/absent	Gaban-Lima 2007
<i>proc. medialis mandibulae</i> shape	pointed/rounded	Gaban-Lima 2007
<i>foramen obturatum</i>	open/closed	
<i>ala preacetabularis ilii</i> shape	rounded/pointed	
prominent <i>tuberculum preacetabulare</i>	present/absent	
<i>sutura iliosynsacralis</i> shape	open/closed	
<i>proc. marginis caudalis</i> shape	rounded/pointed	
<i>spina externa rostri</i> shape	thick/thin	
<i>proc. craniolateralis</i> shape	rounded/pointed	
<i>apex carinae</i> shape	rounded/pointed	
<i>tuberculum cristae medianae</i>	present/absent	
<i>pila coracoidea</i> with V shape	present/absent	
<i>margo caudalis</i> shape	triangular/squared	
prominent <i>tuberculum supracondylare ventrale</i>	present/absent	
<i>pons supratendineus</i> ossification	completely ossified/incompletely ossified	Mayr 2010
<i>spina fibulae</i> ending at <i>crista fibularis</i> level	present/absent	

Appendix 5. (A) Photos (from left to right) of *A. a. neoxena* (FMNH39136), *A. a. koenigi* (USNM 368657) and *A. a. haemorrhous* (AMNH241658), showing that they do not present significant differences in the extension of blue on head.

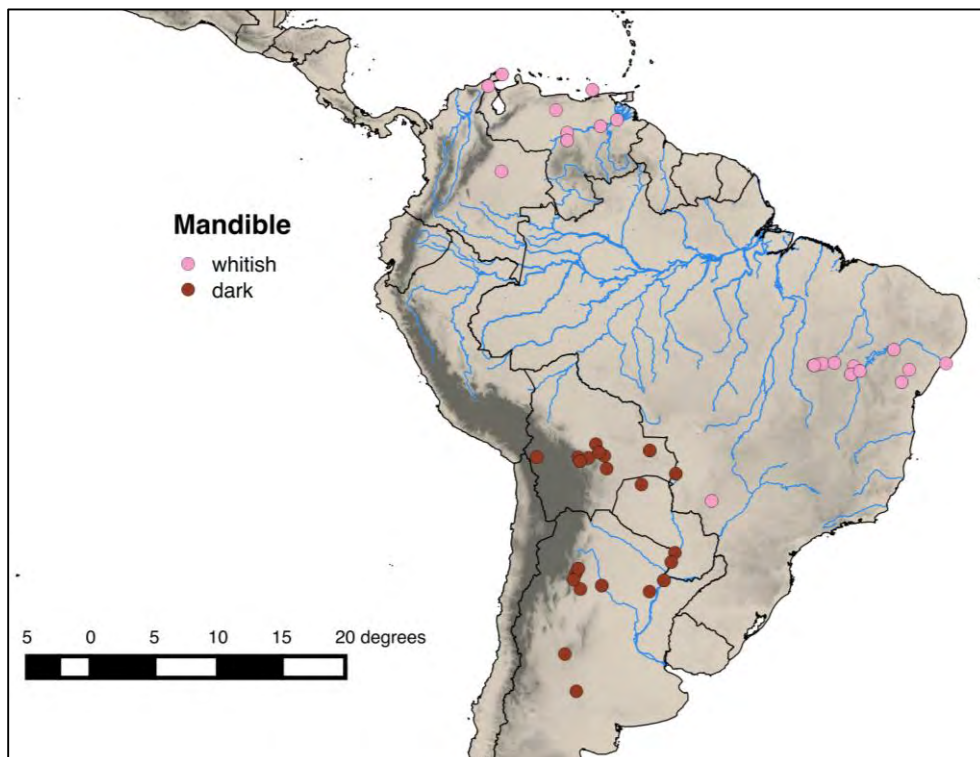


(B) Photos (from top to bottom) of *A. a. neoxena* (FMNH39136), *A. a. koenigi* (USNM 368657) and *A. a. haemorrhous* (AMNH241658), showing that they do not present significant differences in the amount of reddish on undertail.

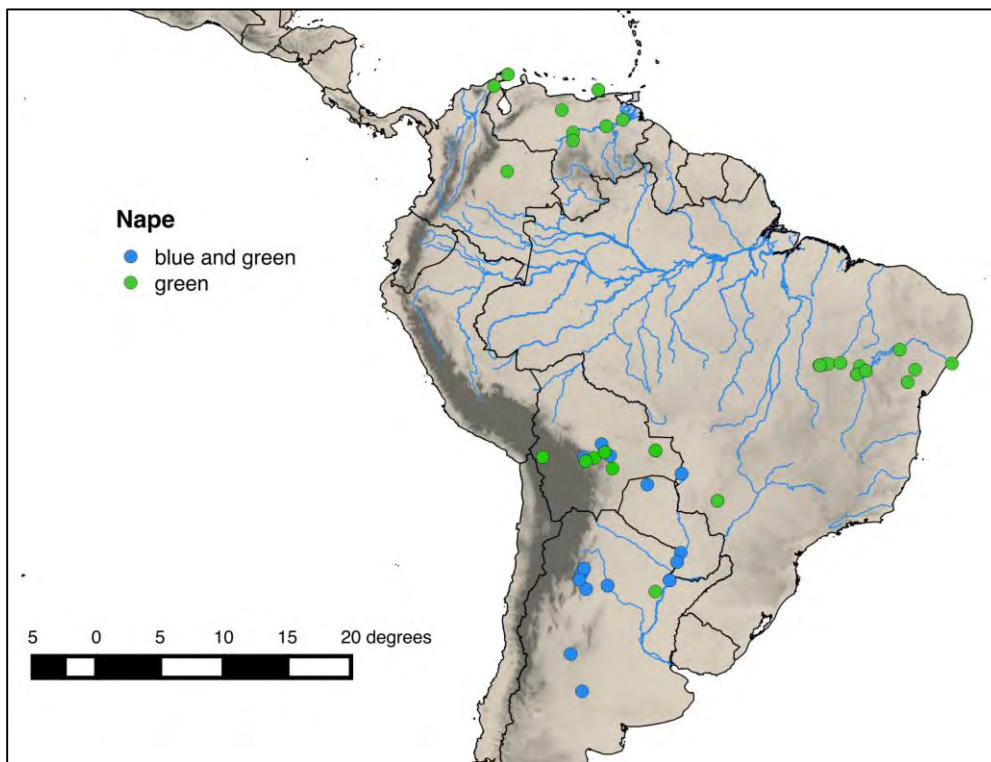


Appendix 6. Mapped characters showing that there are no significant differences in bill and plumage coloration among *A. a. haemorrhous*, *A. a. neoxena* and *A. a. koenigi*; and between *A. a. acuticaudata* and *A. a. neumanni*.

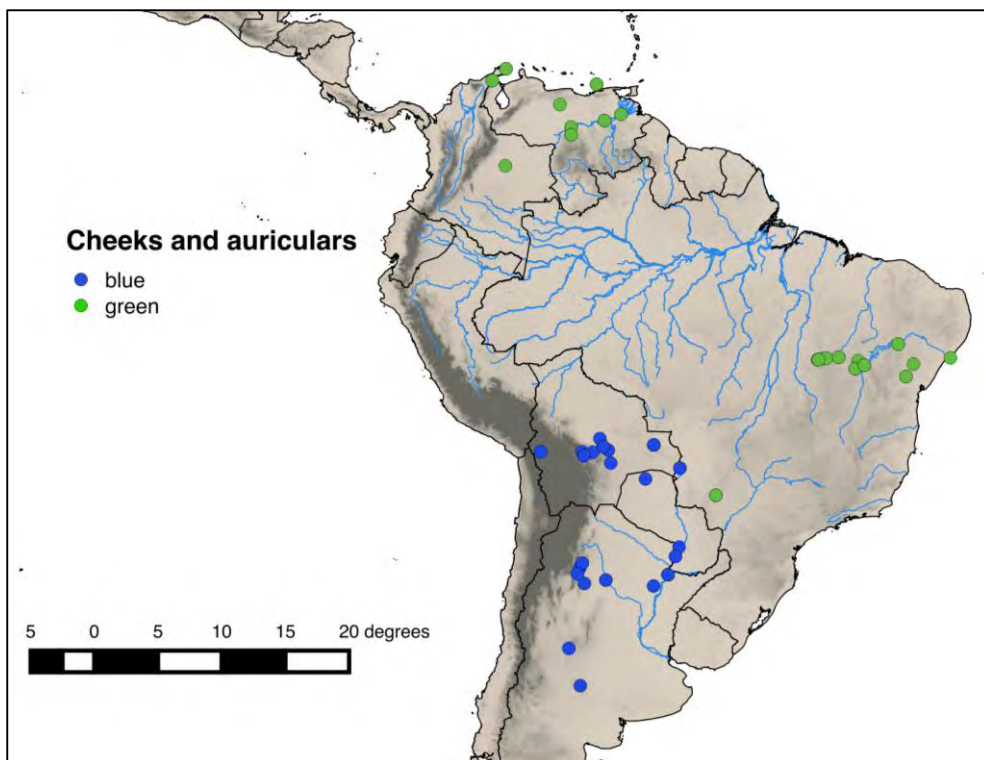
(A) Mandible coloration. Brown: True Cinnamon 139, pink: Pale Pinkish Buff 121D.



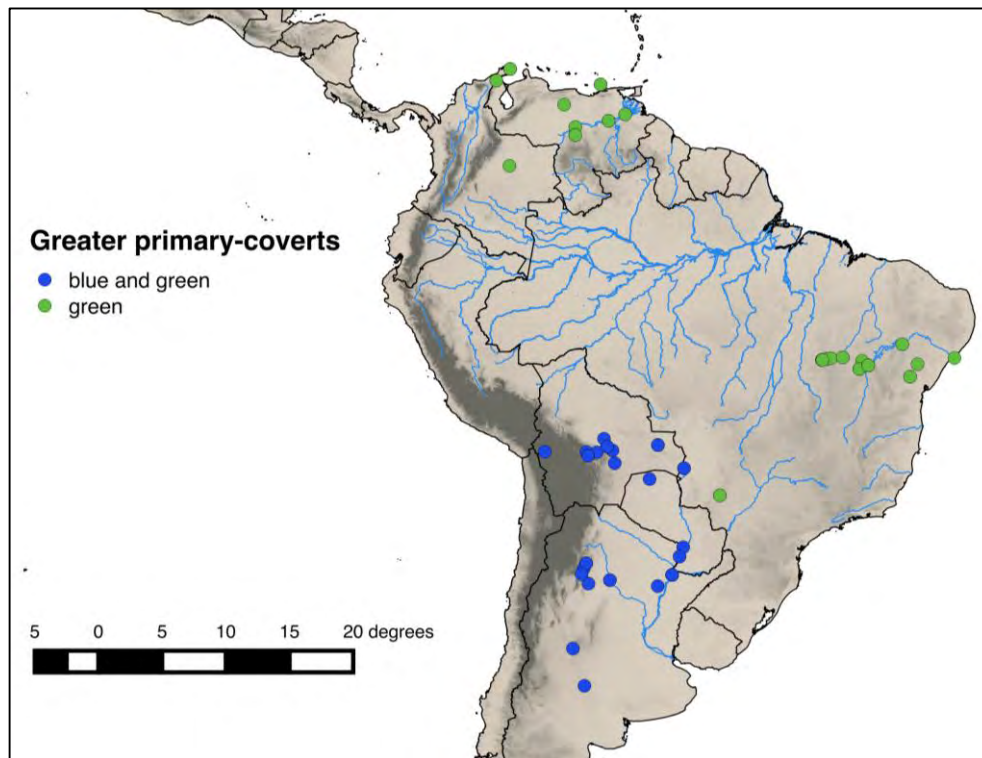
(B) Nape coloration. Green: Parrot Green 60, blue: Cerulean Blue 67 and Parrot Green 60.



(C) Cheeks and auriculars coloration. Green: Parrot Green 60, blue: Cerulean Blue 67.



(D) Greater primary-coverts coloration. Green: Parrot Green 60, blue: Cerulean Blue 67 and Parrot Green 60.



Appendix 7. (A) Photos (from top to bottom) of *A. a. neumanni* (FMNH179086) and *A. a. acuticaudata* (AMNH140634), showing that both taxa exhibit blue on cheeks, auriculars and greater primary-coverts.



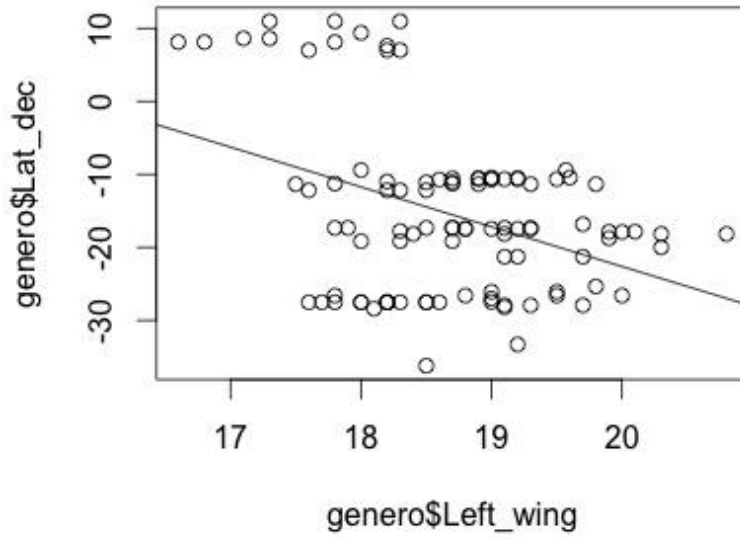
(B) Photos (from top to bottom) of *A. a. neumanni* (FMNH179086) and *A. a. acuticaudata* (AMNH140634), showing that both present Cerulean Blue 67 and Parrot Green 60 on nape.



Appendix 8. Pairwise comparisons between pairs of taxa reported in the literature, using Wilcoxon rank sum test (Tarsus and Culmen) and Tukey test (Width of bill at base and Wing) for 4 morphometric parameters. Ns = no significant difference; <0.05 = significant difference.

Taxa	Culmen	Bill width	Wing	Tarsus
<i>acuticaudatus - haemorrhous</i>	Ns	Ns	Ns	< 0.0001
<i>acuticaudatus - koenigi</i>	Ns	< 0.05	< 0.0001	< 0.05
<i>acuticaudatus - neoxenus</i>	Ns	Ns	Ns	Ns
<i>acuticaudatus - neumanni</i>	Ns	Ns	Ns	Ns
<i>haemorrhous - koenigi</i>	Ns	Ns	< 0.0001	< 0.0001
<i>haemorrhous - neoxenus</i>	Ns	Ns	< 0.05	< 0.05
<i>haemorrhous - neumanni</i>	Ns	Ns	Ns	< 0.0001
<i>koenigi - neoxenus</i>	Ns	Ns	Ns	Ns
<i>koenigi - neumanni</i>	Ns	Ns	< 0.0001	< 0.05
<i>neoxenus - neumanni</i>	Ns	Ns	< 0.05	Ns

Appendix 9. Plot of the linear regression model showing the relation between wing length and latitude.



Capítulo 4

Morphology, plumage variation and taxonomy of the representatives of the genus *Psittacara* Vigors, 1825 (Aves: Psittacidae)

Abstract

The genus *Psittacara* Vigors, 1825 includes 14 taxa of neotropical parrots that range from Central to South America and have historically been included in broader genera due to the presence of a white periophthalmic ring, long pointed-tail and mostly green plumage. In addition, several subspecies have been proposed, based on the amount and position of red feathers. In order to test all morphological differences reported in the literature and verify which taxa can be considered valid, we performed a taxonomic revision of all taxa belonging to *Psittacara*. Our analysis revealed the existence of 14 valid taxa that were considered species according to the Phylogenetic Species Concept. Particularly, within the *P. leucophthalmus* complex, only the nominotypic was considered a valid taxon. Within the *P. holochlorus* complex, *P. brevipes* was elevated at species level, whereas *P. holochlorus* and *P. rubritorquis* confirmed as distinct species. Also, *P. chloropterus* and *P. maugei* were elevated at species level. Within the *P. wagleri* complex, only *P. wagleri* and *P. frontatus* were considered valid. Within the *P. mitratus* complex, we propose *P. mitratus*, *P. chlorogenys* and *P. alticolus* as distinct species. Finally, we confirm the validity of *P. euops*, *P. erythrogegens* and *P. finschi*.

Resumo

O gênero *Psittacara* Vigors, 1825 inclui 14 táxons de psittacídeos neotropicais que ocorrem desde o Centro até o Sul da América, historicamente incluídos em gêneros mais amplos devido à presença de um anel periopftálmico branco, cauda longa e pontiaguda, e plumagem predominantemente verde. Além disso, várias subespécies foram propostas com base na quantidade e posição de penas vermelhas. A fim de testar todas as diferenças morfológicas relatadas na literatura e verificar quais táxons podem ser considerados válidos, foi realizada uma revisão taxonômica de todos os táxons pertencentes a *Psittacara*. Nossa análise revelou a existência de 14 espécies válidas que foram consideradas de acordo com o Conceito Filogenético de Espécie. Em particular, no complexo *P. leucophthalmus*, apenas a forma nominotípica foi considerada um táxon válido. Dentro do complexo *P. holochlorus*, *P. brevipes* foi elevado ao nível de espécie, enquanto *P. holochlorus* e *P. rubritorquis* confirmados como espécies plenas. *P. chloropterus* e *P. maugei* também foram elevados a espécies. Dentro do complexo *P. wagleri*, apenas *P. wagleri* e *P. frontatus* foram considerados táxons válidos. Dentro do complexo *P. mitratus*, consideramos *P. mitratus*, *P. chlorogenys* e *P. alticolus* como espécies plenas. Por fim, confirmamos a validade de *P. euops*, *P. erythrogegens* e *P. finschi*.

Morphology, plumage variation and taxonomy of the representatives of the genus *Psittacara* Vigors, 1825 (Aves: Psittacidae)

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1. INTRODUCTION

The genus *Psittacara* Vigors, 1825 includes 14 taxa of neotropical parakeets (*leucophthalmus*, *mitratus*, *holochlorus*, *chloropterus*, *frontatus*, *strenuus*, *brevipes*, *finschi*, *euops*, *rubritorquis*, *erythrognys*, *wagleri*, *hockingi* and *alticolus*) that range from central to south America and are characterized by mainly green plumage, long and pointed tail, white periophthalmic ring and presence of red feathers throughout the body. Their representants have historically been included in broader genera of parakeets, mainly due to the presence of a white periophthalmic ring, long pointed-tail and mostly green plumage; and several subspecies have been proposed, based on the amount and position of red feathers.

Salvadori (1891) grouped *mitratus*, *rubrolarvatus* (= *erythrognys*), *frontatus*, *finschi*, *wagleri*, *euops*, *chloropterus*, *leucophthalmus*, *callogenys*, *maugei*, *holochlorus* and *brevipes* in the broader genus *Conurus*. Ridgway (1916), based on plumage coloration and bill morphology, included *finschi*, *chloroptera*, *rubritorquis*, *holochlora*, *brevipes* and *euops* in the genus *Aratinga*, recognizing two subspecies within *A. holochlora* (*holochlora* and *strenua*) and two within *A. chloroptera* (*chloroptera* and *maugei*). Particularly, he stated that *A. h. strenua* differs from nominotypic in being larger and occurring in Central America, from El Salvador east to Nicaragua; whereas *A. h. holochlora* can be found in Mexico south to Guatemala. Moreover, he suggested that *A. c. maugei*, occurring on Mona Island, is characterized by light red under primary-coverts, entirely green outside of lesser coverts and a bill that is smaller and darker than in *A. c. chloroptera*, that occurs on Haiti Island. Cory (1918) followed Ridgway, but included also *mitrata*, *rubrolarvata*, *frontatus* and *wagleri* in *Aratinga*; and considered *A. leucophthalmus* as polytypic, comprising the subspecies *leucophthalmus* and *callogenys*, without providing any rationale. Peters (1937) followed Cory and recognized four races within *A. holochlora* (*holochlora*, *brevipes*, *brewsteri* and *rubritorquis*); four within *A. wagleri* (*wagleri*, *transilis*, *frontata* and *minor*); two within *A. mitrata* (*mitrata* and *alticola*) and considered *A. strenua* as a separate species, with no justification for his treatment.

This classification has been followed by the majority of subsequent authors, but different taxonomic combinations have been proposed for some of the taxa. For instance, Marien & Koopman (1955) proposed that *Aratinga* should be considered a subgenus including *holochlora*, *strenua*, *fischi*, *wagleri*, *mitrata*, *erythrogeus* (= *rubrolarvatus*), *leucophthalmus*, *euops*, *chloroptera* and the extinct *labati*. Forshaw (1989), following Ridgway (1916), considered *strenua* as a subspecies of *A. holochlora*, and recognized four races within *A. leucophthalmus* (*leucophthalmus*, *callogenys*, *propinquus* and *nicefori*). He suggested that *A. l. callogenys* is larger in size, with heavier bill and darker plumage than nominate; *A. l. propinquus* is larger than *A. l. leucophthalmus*; whereas *A. l. nicefori* is paler and more yellowish than *A. l. callogenys* and presents a red band across the head. Collar (1997) considered *A. brevipes* and *A. rubritorquis* as separate species and recognized only three subspecies of *A. leucophthalmus* (*leucophthalmus*, *callogenys* and *nicefori*) agreeing with Forshaw (1989) regarding the characters supporting them. Juniper & Parr (1998), following Cory (1918), Forshaw (1989) and Collar (1997), considered *strenua* as a subspecies of *A. holochlora* and recognized only two subspecies of *A. leucophthalmus* (*leucophthalmus* and *callogenys*).

The first authors to suggest that the aforementioned taxa could be separate from the genus *Aratinga* were Silveira *et al.* (2005). Particularly, they suggested that the *A. leucophthalma* group (including *A. leucophthalma*, *A. acuticaudata*, *A. mitrata*, *A. wagleri*, *A. erythrogeus*, *A. finschi*, *A. euops*, *A. chloroptera*, *A. holochlora*, *A. rubritorquis* and *A. brevipes*) is characterized by relatively larger size; mainly green plumage that can exhibit red feathers on face, throat and underwing-coverts; yellowish underside of remiges; green uppertail; olivaceous undertail; white periophthalmic ring and large horny-colored bill. However, Remsen *et al.* (2013) proposed that *A. acuticaudata* should be placed in a separate genus, due to the presence of blue on head and brownish-red on underside of tail.

Arndt (2006), revising the *A. mitrata* complex based on plumage and morphometric analyses, described two new subspecies, *A. m. chlorogenys* and *A. m. tucumana*; whereas he considered *alticola* as a separate species and he described the new species *A. hockingi*. Agnolin (2009) demonstrated that the characters suggested to separate *A. m. tucumana* from *A. m. mitrata* were not constant, but showed individual and age variation, and suggested that *tucumana* be considered a junior synonym of nominotypic *A. mitrata*. Forshaw (2010) considered *A. strenua*, *A. rubritorquis*, *A. alticola*, *A. hockingi* and *A. brevipes* as separate species, recognized two subspecies of *A. frontata* (*frontata* and *minor*) and only two subspecies of *A. leucophthalmus* (*leucophthalmus*

and *callogenys*). Finally, Remsen *et al.* (2013) based on plumage analysis and comparison with recent molecular studies, agreeing with Silveira *et al.* (2005), proposed that the species *leucophthalmus*, *holochlorus*, *strenuus*, *wagleri*, *mitratus*, *erythrogegens*, *finschi* and *euops* be placed in the separate genus *Psittacara*.

No author has ever performed a detailed revision of all these taxa, in order to test all morphological differences reported in the literature and verify which taxa can be considered valid. In fact, both molecular and morphological studies have included only some of the taxa and simply followed previous classifications with no rationale for their treatment. Therefore, this study aims to examine a large number of specimens belonging to all taxa of *Psittacara* and perform a taxonomic revision in order to understand the morphological variation within the group.

2. MATERIALS AND METHODS

A total of 659 skins of *Psittacara* (Appendix 1) were examined in the following institutions: Museu de Zoologia da Universidade de São Paulo (MZUSP), São Paulo, Brazil; American Museum of Natural History (AMNH), New York, USA; Smithsonian Institution National Museum of Natural History (USNM), Washington, USA; Field Museum of Natural History (FMNH), Chicago, USA; Louisiana Museum of Natural History (LSUMZ), Baton Rouge, USA; Natural History Museum (BMNH), Tring, UK; Muséum National d'Histoire Naturelle (MNHN), Paris, France. Six type specimens were analyzed using high-quality photos: two from the Museum of Comparative Zoology (MCZ), Harvard University, Boston, USA; two from the American Museum of Natural History (AMNH), New York, USA; one from the Academy of Natural Sciences of Philadelphia (ANSP), Philadelphia, USA; and one from the Museum für Naturkunde (ZMB), Berlin, Germany. Furthermore, four specimens from the Museo Argentino de Ciencias Naturales Bernardino Rivadavia (MACN), Buenos Aires, Argentina were also examined using photos.

Measurements and photos were taken for each single specimen analyzed. Also, all information attached to the specimens, such as museum catalogue number, sex, locality, date and collector, was recorded. Plumage coloration was described using the terminology of Smithe (1975) and Forshaw (2010). It is worth noting that bill, periophthalmic ring and tarsus coloration was codified after examination of alive individuals' photos. Juveniles were identified through incomplete plumage coloring and bill displaying soft areas on the sides of the maxilla (Arndt 2006), and excluded from morphometric analyses. Measurements of exposed culmen without cere,

width at base of bill, tarsus-metatarsus, tail and wing chord were obtained for 649 individuals, including captured or captive bred birds, since their exclusion did not change analyses results. Measurements were taken with a digital caliper with a precision of 0.05 mm and a ruler (precision 0.5 mm), according to Baldwin *et al.* (1931). Rectrice measurements were discarded due to the large amount of specimens exhibiting damaged tail. Moreover, 93 skeletons of *Psittacara* (Appendix 2) were examined. Those specimens that could not be identified at species level, lacking locality information or being captive birds, were excluded from further analyses. Osteological and morphological characters, described according to Baumel *et al.* (1993) and Sereno (2007), were used to propose a phylogenetic hypothesis for the genus *Aratinga* sensu Peters (1937) (Ferraroni & Silveira in prep.).

In order to assess differences in body size statistical analyses, using a significance level of 0.05, were performed in R 3.0.2 (R Core Team 2013), and included Shapiro-Wilk normality test and Fligner-Killeen Test for homogeneity of variances. To test for sexual dimorphism Kruskal-Wallis and Wilcox test were performed; whereas for morphometric differences we used Kruskal-Wallis and Wilcoxon rank sum test for multiple comparisons between pairs of taxa. Finally, we performed a principal component analysis (PCA), transforming initial measurements prior to analysis, in order to eliminate the effect of shape and size.

The criterion adopted for identifying and delimiting taxonomic units was diagnosability. Characters were selected to find fully diagnosable clusters of individuals sharing similar morphology. These clusters were, after analysis, considered species following the Phylogenetic Species Concept (Nelson & Platnik 1981; Cracraft 1983, 1987, 1989; McKittrick & Zink 1988).

Characters and specimens locality (obtained for 567 individuals) were mapped using QuantumGIS 2.0.1-Dufour (2013). Geographical coordinates were obtained using ornithological gazetteers (Paynter Jr 1982, 1989, 1992, 1993, 1995, 1997; Stephens & Taylor 1983; Paynter Jr & Taylor Jr 1991a, 1991b; Vanzolini 1992) or, when not available in the literature, from the following websites: <http://www.fallingrain.com>, <http://www.geographic.org>, <http://www.maplandia.com> and <http://www.wikimapia.com>. Also, photos found on websites such as <http://wikiaves.com.br> and <http://ibc.lynxeds.com> were used to confirm the current distribution of taxa. Finally, the list of synonyms includes all names considered applicable to the examined taxa after the taxonomic revision. Some vernacular names were included, when used as base for other descriptions. Moreover, were included erroneously spelled names, changes of combination and changes of

taxonomic level. When the same name was cited by more than one author, only the first was included in the list.

3. RESULTS AND DISCUSSION

3.1 Morphological characters

A total of 14 out of the 31 morphological characters examined (Appendix 3) supports the genus *Psittacara* Vigors. These characters states were: (1) bill: Pale Pinkish Buff 121D, (2) tarsus: Flesh Color 5, (3) periophthalmic ring: white, (4) scapulars: Parrot Green 260, (5) median wing-coverts: Parrot Green 260, (6) greater primary-coverts: Parrot Green 260, (7) greater secondary-coverts: Parrot Green 260, (8) folded secondaries: Parrot Green 260, (9) rump: Parrot Green 260, (10) primaries: Parrot Green 260 with Jet Black 89 edges, (11) secondaries: Parrot Green 260 with Jet Black 89 edges, (12) underwing-coverts: Grayish Olive 43, (13) uppertail: Parrot Green 260, (14) undertail: Grayish Olive 43. Furthermore, 8 out of 40 osteological characters (Appendix 4) support the genus *Psittacara*, when compared with the taxa belonging to *Aratinga* sensu Peters (1937). These characters are: (1) complete orbit, (2) *rostrum maxillae* with triangular shape, (3) *proc. retroarticularis* with triangular acute shape, (4) marked foramina in the supraorbital region, (5) crista of the median portion of the palatine touching the pterygoid, (6) pointed *apex carinae*, (7) triangular *margo caudalis*, (8) not prominent *tuberculum preacetabularis*.

From our analysis a total of 14 taxa could be unambiguously diagnosed (Figures 1, 2, 3, 4) and were considered species according to the Phylogenetic Species Concept. These species were placed in the genus *Psittacara* Vigors, 1825, likewise Remsen *et al.* (2013), since it is the oldest genus name available and their representatives present a robust bill, thin tip of maxilla, naked periophthalmic ring, medium wings, long and graduated tail (Vigors 1825). Moreover, Vigors (1825) selected *Psittacus gujanensis* Gmelin, 1788 and the “Perruche-Ara Pavouane” Levaillant, 1801 as the type species for the genus *Psittacara*. Since these names refer to *Psittacus leucophthalmus* Statius Muller, 1776, the type species of this genus is *Psittacara leucophthalmus*. Despite the type specimen of *Psittacus leucophthalmus* could not be located, since there are no doubts about its identity there is no need to designate a neotype (Article 75.2. of the *International Code of Zoological Nomenclature* 1999, hereafter the *Code*). The same applies to the type specimen of *Sittace euops* Wagler, 1832 and *Psittacura (Psittacus) erythrogeus* Lesson, 1844.

3.2 The *Psittacara leucophthalmus* complex

P. leucophthalmus has been considered polytypic by several authors. Particularly, Sclater (1862) described a new species, *Conurus propinquus*, occurring in southeast Brazil, without giving any rationale. This has subsequently been considered a subspecies of *A. leucophthalmus* based on its larger size than the nominotypic (Arndt 1981; Forshaw 1989). Salvadori (1891) described the new species *Conurus callogenys* from eastern Ecuador, larger and darker than *C. leucophthalmus*, and with red patches restricted to the lower part of cheeks. Subsequent authors (Cory 1918; Peters 1937; Meyer de Schauensee 1946; Arndt 1981; Forshaw 1989; Collar 1997; Juniper & Parr 1998; Forshaw 2010) considered *callogenys* as a subspecies of *A. leucophthalmus* with more robust bill and darker plumage, especially in the westernmost birds; and extended its range to upper Amazonia, southeastern Colombia, eastern Ecuador, northeastern Peru and northwestern Brazil (where it intergrades with *A. l. leucophthalmus* in central Amazonia). Moreover, Meyer de Schauensee (1946) described a new subspecies from Meta, Colombia, *Aratinga leucophthalmus nicefori*, that presents red on forehead and paler plumage than *A. l. callogenys*.

Our analysis did not support the existence of four races within *P. leucophthalmus*, since all examined individuals exhibit same green plumage and scattered red feathers throughout the body. The presence of red feathers does not seem to depend on age, as suggested by some authors, since several adults with totally green plumage have been observed in the wild (C. Gussoni pers. comm.). Furthermore, *A. l. propinquus* does not differ significantly in size from the other races (Appendix 5) and *A. l. callogenys* does not exhibit darker plumage or red feathers restricted to lower part of cheeks (Appendix 6). It is worth noting that no specimen of *A. l. nicefori* could be examined or located in the visited and contacted collections. Also, the type specimen of *A. l. nicefori*, that should be in the Museo del Instituto de la Salle in Bogotá, could not be found and it has probably been destroyed in a fire occurred in 1948 (G. Stiles pers. comm.). Nevertheless, any of the analyzed specimens from Meta region exhibit red forehead, therefore we suggest that *A. l. nicefori* represents an occasional geographical variation of *P. leucophthalmus*. We here consider *Conurus propinquus* Sclater, 1862; *Conurus callogenys* Salvadori, 1891 and *Aratinga leucophthalmus nicefori* Meyer de Schauensee, 1946 as junior synonyms of *Psittacus leucophthalmus* Statius Muller, 1776. It is worth noting that *P. leucophthalmus* occurs sympatrically with *P. wagleri* in northern Venezuela and western Colombia; with *P. frontatus* and *P. chlorogenys* in Peru and with *P. mitratus* in Bolivia and north Argentina.

***Psittacara leucophthalmus* (Statius Muller, 1776)**

Psittaca guianensis Brisson, 1760. Ornithologie, IV, p. 332, pl. xxviii, f. 1.

Psittacus leucophthalmus Statius Muller, 1776. Natursystem, p. 75. Type specimen: missing. Type locality: Guiana.

Psittacus notatus Statius Muller, 1776. Systema Naturae, p. 75.

Psittacus pavua Boddaert, 1783. Table des Planches Enlumineez d'Histoire Naturelle, de M. D'aubenton, pl. 167, p. 10.

Psittacus gujanensis Gmelin, 1788. Systema Naturae, I, p. 324, n. 70.

Aratinga nobilis sive guianensis Spix, 1824. Avium Species Novae, I, p. 36.

Sittace gujanensis Wagler, 1832. Monographia Psittacorum, p.660.

Aratinga nobilis Brehm, 1842. Monographie der Papageien, t. 27, p. 21.

Conurus guianensis Cabanis, 1848 in Schomburgk, 1848. Reisen in British Guiana, n° 283, p. 729.

Evopsitta guianensis Bonaparte, 1856. Naumannia, Conspectus Psittacorum n°21.

Conurus propinquus Sclater, 1862. Catalogue of a Collection of American Birds, n°2065, p. 346.

Type: BMNH1890.6.1.38, S. E. Brazil, Sclater Collection.

Conurus leucophthalmus Gray, 1870. Hand-list of Genera and Species of Birds, II, n°8090, p. 145.

Conurus callogenys Salvadori, 1891. Catalogue of the Birds in the British Museum, XX, p. 188.

Type: BMNH1889.1.30.81, Sarayacu, Ecuador, C. Buckley.

Aratinga leucophthalmus Brabourne & Chubb, 1912. The Birds of South America, I, p. 82.

Aratinga leucophthalmus leucophthalmus Cory, 1918. Catalogue of the Birds of the Americas, p. 59.

Aratinga leucophthalmus callogenys Cory, 1918. Catalogue of the Birds of the Americas, p. 59.

Aratinga leucophthalmus nicefori Meyer de Schauensee, 1946. Notulae Naturae n°163, Colombian Zoological Survey. Part III. Notes on Colombian Birds, p. 2. Type (lost): n°25, Museo del Instituto de la Salle, Bogotá, Colombia, collected at Guaicaramo, Rio Guavio, Cundinamarca-Meta, 4.ix.1937.

Aratinga leucophthalmus leucophthalmus - Arndt, 1981. Sudamerikanische Sittiche Keilschwanzsittiche i.e. S., Horst Muller-Verlag Walsrode, p. 74.

Aratinga leucophthalmus callogenys - Arndt, 1981. Sudamerikanische Sittiche Keilschwanzsittiche i.e. S., Horst Muller-Verlag Walsrode, p. 75.

Aratinga leucophthalmus nicefori - Arndt, 1981. Sudamerikanische Sittiche Keilschwanzsittiche i.e. S., Horst Muller-Verlag Walsrode, p. 75.

Aratinga leucophthalmus propinquus Arndt, 1981. Sudamerikanische Sittiche Keilschwanzsittiche i.e. S., Horst Muller-Verlag Walsrode, p. 75.

Aratinga leucophthalma leucophthalma Forshaw, 2010. Parrots of the World. A & C Black Publishers Ltd, London, p. 194.

Aratinga leucophthalma callogenys Forshaw, 2010. Parrots of the World. A & C Black Publishers Ltd, London, p. 194.

Aratinga leucophthalma nicefori Forshaw, 2010. Parrots of the World. A & C Black Publishers Ltd, London, p. 194.

Diagnosis: characterized by mainly green (Parrot Green 260) upperparts and brighter green (Lime Green 159) underparts. It can be totally green or exhibit scattered red (Scarlet 14) feathers on cheeks, auriculars, dorsal neck, upper throat, throat, lesser and median wing-coverts edges, carpal edge and crural feathers. Lesser underwing-coverts are red (Scarlet 14) and greater underwing-coverts are yellow (Spectrum Yellow 55).

Distribution: common in south western Colombia, north eastern Venezuela, Guyana, Suriname, eastern Ecuador, eastern Peru, Bolivia, Paraguay, Uruguay, northern Argentina and in the Brazilian states: Acre, Amazonia, Amapá, Roraima, Pará, Maranhão, Rondônia, Mato Grosso, Tocantins, Mato Grosso do Sul, Goiás, Minas Gerais, Espírito Santo, Rio de Janeiro, São Paulo, Paraná, Santa Catarina and Rio Grande do Sul.

3.3 The *Psittacara holochlorus* complex

Several taxonomic arrangements have been proposed for the *P. holochlorus* complex. Lawrence (1871) described *Conurus holochlorus brevipes* as a variation of *A. holochlora* occurring on Socorro Island and presenting shorter tarsus and wing; classification that has been followed by some authors (Ridgway 1887; Peters 1937; Arndt 1981; Forshaw 1989). On the other hand, others (Salvadori 1891; Ridgway 1916; Forshaw 2010) considered *A. brevipes* as a separate species larger and with darker green plumage than *A. holochlora*. Another taxon that has been considered subspecies of *A. holochlora* is *Conurus holochlorus strenuus* Ridgway, 1915 described as larger,

especially in bill and tarsus, than the nominotypic and occurring in Ometepe, Nicaragua. The majority of the authors followed this treatment (Salvadori 1891; Cory 1918; Peters 1937; Arndt 1981; Forshaw 1989; Collar 1997; Juniper & Parr 1998), whereas Forshaw (2010) considered *A. holochlora* a separate species. Moreover, *A. h. brewsteri* Nelson, 1928 has also been considered a subspecies of *A. holochlora* (Peters, 1937; Arndt 1981; Forshaw 1989; Collar 1997; Juniper & Parr 1998; Forshaw 2010), characterized by shorter bill, bluish feathers on crown and breast, and restricted to western Chihuahua, Mexico. Finally, *A. rubritorquis* has sometimes been considered a subspecies of *A. holochlora* (Salvadori 1891; Dearborn 1907; Peters 1937; Arndt 1981; Forshaw 1989; Juniper & Parr 1998) slightly smaller and with orange-red on throat. Interestingly, the type specimen described by Sclater (1886) was hosted in the Zoological Garden of London and was called red-collared due to the presence of red feathers on the sides of the neck forming a collar. For this reason, Salvadori (1891) initially considered it an accidental variety of *C. holochlorus*, since similar congeneric taxa can exhibit an occasional red collar. However, in 1892, when Salvin & Godman examined more specimens from Nicaragua, Salvadori (1892) agreed with them that *rubritorquis* represented a separate species.

Our analysis reported the existence of three valid taxa within the *P. holochlorus* complex, *P. holochlorus*, *P. brevipes* and *P. rubritorquis*. *P. holochlorus* is the only species with totally green plumage that sometimes presents some scattered red feathers on upper throat and throat. In fact, there are no significant morphometric differences between *A. h. holochlora* and *A. h. brewsteri* (Appendix 5) and some specimens of *A. h. holochlora* (USNM158508, USNM158509) and *A. h. strenua* (FMNH50108, LSUMZ65534, USNM257758) can exhibit bluish feathers on crown, such as in *A. h. brewsteri*. Accordingly, we here consider *Aratinga holochlora brewsteri* Nelson, 1928 as an occasional geographical variation and a junior synonym of *Conurus holochlorus* Sclater, 1859.

From our analysis it also resulted that *P. brevipes* is significantly larger than *P. holochlorus* (Table 2) and it always presents totally green plumage as *A. h. strenua*, with no occasional presence of scattered red feathers as occurs in *P. holochlorus*. Therefore, we suggest that *Conurus holochlorus strenuus* Ridgway, 1915 be considered a junior synonym of *Conurus holochlorus* var. *brevipes* Lawrence, 1871 and we elevate *brevipes* at species level. Nevertheless, it is worth noting that few individuals of *P. brevipes* (USNM91098, FMNH15506) that occur sympatrically with *P. rubritorquis* in Guatemala and Nicaragua can exhibit few red feathers on upper throat and throat (Appendix 7).

Lastly, we agree with Ridgway (1916), Collar (1997) and Forshaw (2010) that *P. rubritorquis*

should be considered a separate taxon characterized by red mixed with yellow on upper throat and throat; that occurs sympatrically with *P. brevipes* in Guatemala and Nicaragua. Regarding the type locality, Sclater (1886) did not know the provenience of the individual he based his description on. In fact, he suggested South America or West Indies. Therefore, according to the Art. 76A.2. of the *Code*, we suggest "central Nicaragua" Salvin & Godman (1892) as the type locality, since it is the first published locality that corresponds to *P. rubritorquis*' range.

***Psittacara holochlorus* (Sclater, 1859)**

Conurus holochlorus Sclater, 1859. The Annals and Magazine of Natural History, including Zoology, Botany and Geology, IV, third series, p. 224. Type: BMNH1890.6.1.35, Jalapa, Vera Cruz, Mexico, Sclater Collection.

Aratinga holochlora holochlora Ridgway, 1916. Bulletin of the United States National Museum, n°50, part VII, p. 157.

Aratinga holochlora brewsteri Nelson, 1928. Proceedings of the Biological Society of Washington, XLI, p. 154. Type: MCZ24700, male, Hacienda de San Rafael, western Chihuahua, Mexico, Brewster collection, collected 5.v.1888 by M. Abbott Frazar.

Aratinga holochlora holochlora - Nelson, 1928. Proceedings of the Biological Society of Washington, XLI, p. 154.

Diagnosis: totally green (Parrot Green 260) upperparts and brighter (Lime Green 159) underparts, can present scattered red (Scarlet 14) feathers on upper throat and throat.

Distribution: ranges disjunctly from northwestern (northern Sinaloa and southwestern Chihuahua) to eastern (from eastern Nuevo Leon and Tamaulipas to central Veracruz) and south Mexico (eastern Oaxaca to eastern Chiapas).

***Psittacara brevipes* (Lawrence, 1871)**

Conurus holochlorus var. *brevipes* "Baird MS." Lawrence, 1871. Annals of the Lyceum of Natural History, X, p. 14. Type: USNM39971, male, Socorro Island, Mexico, spring 1865, A. J. Grayson.

Conurus brevipes Salvadori, 1891. Catalogue of the Birds in the British Museum, XX, p. 191.

Conurus holochlorus strenuus Ridgway, 1915. Proceedings of the Biological Society of Washington, XXVIII, p. 106. Type: USNM91098, male, Ometepe, Nicaragua, 23.ii.1883, C. C. Nutting.

Conurus holochlorus holochlorus Ridgway, 1915. Proceedings of the Biological Society of Washington, XXVIII, p. 106.

Aratinga holochlora strenua Ridgway, 1916. Bulletin of the United States National Museum, n°50, part VII, p. 158.

Aratinga holochlora holochlora Ridgway, 1916. Bulletin of the United States National Museum, n°50, part VII, p. 158.

Aratinga strenua Forshaw, 2010. Parrots of the World A & C Black Publishers Ltd, London, p. 190.

Aratinga brevipes Forshaw, 2010. Parrots of the World A & C Black Publishers Ltd, London, p. 190.

Psittacara strenuus Remsen, J. V.; Schirtzinger, E. E.; Ferraroni, A.; Silveira, L. F. and Wright, T.F. 2013. DNA-sequence and morphological data require revision of the parrot genus *Aratinga* (Aves: Psittacidae). *Zootaxa* 3641 (3), p. 299.

Diagnosis: totally green (Parrot Green 260) upperparts and lighter (Lime Green 159) underparts.

Distribution: Socorro Island, eastern Oaxaca, southern Mexico, to El Salvador, southern Honduras, inland Guatemala and central Nicaragua.

***Psittacara rubritorquis* (Sclater, 1886)**

Conurus rubritorquis Sclater, 1886. Proceedings of the Zoological Society of London, XXXV, p. 539, pl. 56. Type: BMNH1890.6.1.42, male, South America or West Indies, died in captivity, received on 29.ix.1886, Sclater Collection.

Conurus holochlorus (var) Salvadori, 1891. Catalogue of the Birds in the British Museum, XX, p. 190.

Conurus rubritorquis - Salvin & Godman, 1892. On a Collection of Birds from Central Nicaragua, Ibis XXXIV, p. 328.

Conurus rubritorques Salvadori, 1892. Bulletin of the British Ornithologists' Club, I, n° 3, p. 11.

Conurus holochlorus rubritorques Dearborn, 1907. Catalogue of a Collection of Birds from Guatemala, Field Museum of Natural History, Ornithological Series, I, N° 3, Publication 125, p. 85.

Aratinga rubritorquis Ridgway, 1916. Bulletin of the United States National Museum, n°50, part VII, p. 156.

Aratinga holochlora rubritorquis Peters, 1937. Checklist of Birds of the World, III, p. 186.

Aratinga rubritorquis - Collar, 1997. In: Eds del Hoyo, J.; Elliott, A. and Sargatal, J. Handbook of the Birds of the World, IV: Sandgrouse to Cuckoos, p. 429.

Aratinga holochlora rubritorquis - Juniper & Parr, 1998. Parrots. A Guide to Parrots of the World, p. 439.

Aratinga rubritorquis - Forshaw, 2010. Parrots of the World. A & C Black Publishers Ltd, London, p. 190.

Diagnosis: characterized by red (Scarlet 14) mixed with yellow (Spectrum Yellow 55) on upper throat and throat. It can present scattered red (Scarlet 14) feathers on nape and cheeks.

Distribution: from eastern Guatemala to Honduras and western Nicaragua.

3.4 *Psittacara finschi*

P. finschi was first placed in the genus *Aratinga* by Ridgway (1916) and this classification has been followed by all following authors (Cory 1918; Peters 1937; Arndt 1981; Forshaw 1989; Collar 1997; Juniper & Parr 1998; Forshaw 2010). Our analysis confirmed that it can be separated from the other species due to its dark red forehead; red part of crown, bend of wing, carpal edge, lesser underwing-coverts and yellow greater underwing-coverts.

***Psittacara finschi* (Salvin, 1871)**

Conurus finschi Salvin, 1871. On the Psittacidae of Central America, Ibis, pl. iv, p. 91. Type:

BMNH1889.1.30.68, male, Bugaba, west of David, south slope of Chiriqui volcano, Veragua, Panama, Arcé collection.

Aratinga finschi Ridgway, 1916. Bulletin of the United States National Museum, n°50, part VII, p. 52.

Diagnosis: characterized by dark red (Maroon 31) forehead; red (Scarlet 14) on part of crown, bend of wing, carpal edge and lesser underwing-coverts. The greater underwing-coverts are yellow (Spectrum Yellow 55). It presents scattered red feathers on cheeks, auriculars, upper throat and throat.

Distribution: ranges from Nicaragua to Costa Rica and western Panama.

3.5 *Psittacara euops*

Several authors (D'Orbigny 1840; Gray 1845, 1859; Gundlach 1866; Cory 1886; Salvadori 1891) included *euops* in the genus *Conurus*, while Ridgway (1916) was the first to place it in the genus *Aratinga* and to point out that it was one of the smallest species within the genus. This treatment has been followed by all subsequent authors (Cory 1918; Peters 1937; Arndt 1981; Forshaw 1989; Collar 1997; Juniper & Parr 1998; Forshaw 2010). Moreover, it is worth noting that when Wagler (1832) described *Sittace euops* he reported "America" as the type locality, whereas we know that it is endemic of Cuba. Therefore, according to the Art. 76A.2. of the *Code*, we suggest that the type locality should be "Cuba Island" mentioned by D'Orbigny (1840), who is the first author to report the correct locality in the literature.

***Psittacara euops* (Wagler, 1832)**

Sittace euops Wagler, 1832. Monographia Psittacorum, t. xxiv, f. 2, p. 638. Type specimen: missing.

Type locality: America.

Conurus guianensis D'Orbigny, 1840 in La Sagra. Historia física, política y Natural de la Isla de Cuba, III, p. 122.

Conurus euops Gray, 1845. Genera of Birds, II, n°26, p. 414.

Evopsitta euops Bonaparte, 1854. Revue et Magasin de Zoologie, n°77, p. 151.

Psittacara euops Souancé, 1856. Revue et Magasin de Zoologie, n° 22, p. 59.

Conurus euops - Gray, 1859. List of the Specimens of Birds in the British Museum, III, p. 33.

Conurus evops Gundlach, 1866. Repertorio Físico-Natural de la Isla de Cuba, I, p. 297.

Conurus euops - Cory, 1886. The Birds of the West Indies, including the Bahama Islands, the Greater and the Lesser Antilles, excepting the Islands of Tobago and Trinidad. The Auk, III, p. 455.

Aratinga euops Ridgway, 1916. Bulletin of the United States National Museum, n°50, part VII, p. 160.

Diagnosis: diagnosed by mainly green plumage with red (Scarlet 14) on bend of wing, carpal edge and lesser underwing-coverts. It exhibits scattered red (Scarlet 14) feathers on crown, nape, cheeks, auriculars, upper throat, throat, breast, belly and crural feathers.

Distribution: endemic of Cuba Island, occurs mainly in the Zapata peninsula, Trinidad Mountains and Sierra de Najasa.

3.6 The *Psittacara chloropterus* complex

P. chloropterus was first described by Souancé (1856) as a mainly green parakeet from Saint Domingo with red lesser underwing-coverts; whereas according to some authors (Cory 1885, 1886; Ridgway 1916; Juniper & Parr 1998) it exhibits red on bend of wing, edge of wing and underwing-coverts. Collar (1997) reported that the red on underwing-coverts is restricted to the outermost feathers. Also, according to Juniper & Parr (1998) and Olson (2015), *P. chloropterus* may have occurred on Puerto Rico, where it should have gone extinct by the end of the 19th century.

Ridgway (1916) was the first author to place *chloroptera* in *Aratinga* and to consider it polytypic, treatment followed by all subsequent authors (Cory 1918; Peters 1937; Arndt 1981; Collar 1997; Juniper & Parr 1998; Forshaw 2010). *A. c. maugeri*, now extinct and formerly from Mona Island, near Puerto Rico, exhibits smaller and darker bill, and light red on under primary coverts with some yellowish olive feathers (Ridgway 1916). On the other hand, some authors (Sclater 1856; Cabanis 1881; Cory 1886; Salvadori 1891) stated that *maugeri* presents red on both lesser and greater underwing-coverts. Recently, Olson (2015) published a work based on osteology and morphology, supporting the existence of two separate species and suggesting that *P. maugeri* differs from *P. chloropterus* in exhibiting pinkish greater primary-coverts and under primary coverts, whereas the latter presents yellowish olive-green greater primary-coverts; and that the type specimen of *maugeri* had probably been collected in Puerto Rico. Our analysis confirmed the existence of two different taxa, however, all examined specimens of *P. maugeri* (including three specimens in the Louisiana Museum of Natural History (LSUMZ), the holotype in the Muséum National d'Histoire Naturelle (MNHN) and one specimen in Field Museum (FMNH)) exhibit red on carpal edge and red mixed with yellow on lesser and greater underwing-coverts (Appendix 8). On the other hand, all specimens of *P. chloropterus* present red on bend of wing, carpal edge, lesser underwing-coverts and mainly red greater underwing-coverts with yellow edges. Moreover, no significant morphometric differences were found between the two species (Table 1).

***Psittacara chloropterus* Souancé, 1856**

Psittacara chloroptera Souancé, 1856. Revue et Magasin de Zoologie, n° 21, p. 59. Type:

BMNH1859.11.22.56, San Domingo, West Indies, E. Pazaduki.

Evopsitta chloroptera Bonaparte, 1856. Naumannia, Conspectus Psittacorum n°23.

Conurus chloropterus Sclater, 1857. Proceedings of the Zoological Society of London, XXV, n°41, p.

234.

Psittacus (Conurus) chloropterus Bryant, 1866. A List of the Birds of St. Domingo, with Description of some New Species or Varieties, Proceedings of the Boston Society of Natural History, XI, p. 96.

Conurus pavua Finsch, 1867. Die Papageien, p. 918.

Conurus chloropterus - Cory, 1885. The Birds of Haiti and San Domingo, pl. 15, p. 113.

Aratinga chloroptera chloroptera Ridgway, 1916. Bulletin of the United States National Museum, n°50, part VII, p. 153.

Psittacara chloroptera - Olson, 2015. History, Morphology, and Fossil Record of the Extinct Puerto Rican Parakeet *Psittacara maugéi* Souancé, The Wilson Journal of Ornithology 127 (1), p. 1.

Diagnosis: characterized by red (Scarlet 14) on bend of wing, carpal edge, lesser underwing-coverts and mainly red (Scarlet 14) greater underwing-coverts with yellow (Spectrum Yellow 55) edges.

Distribution: occurs in Haiti and Dominican Republic, feral populations in Puerto Rico, Guadeloupe and possibly Florida.

***Psittacara maugéi* Souancé, 1856**

Psittacara maugéi Souancé, 1856. Revue et Magasin de Zoologie, p. 59. Holotype: MNHN132, C.G. 2004 n°1057, N.C. 369, Mr Maugé, Antilles.

Evopsitta maugéi Bonaparte, 1856. Naumannia, Conspectus Psittacorum n°22.

Conurus maugéi Sclater, 1857. Proceedings of the Zoological Society of London, XXV, p. 225.

Conurus gundlachi Cabanis, 1881. Ornithologisches Centralblatt, VI, p. 5.

Conurus euops gundlachi Reichenow, 1881. Journal fur Ornithologie, n°26, p. 275.

Conurus gundlachi - Cory, 1886. The Birds of the West Indies, including the Bahama Islands, the Greater and the Lesser Antilles, excepting the Islands of Tobago and Trinidad. The Auk, III, p. 457.

Conurus maugéi - Salvadori, 1891. Catalogue of the Birds in the British Museum, XX, p. 189.

Aratinga chloroptera maugéi Ridgway, 1916. Bulletin of the United States National Museum, n°50, part VII, p. 155.

Psittacara maugéi - Olson, 2015. History, Morphology, and Fossil Record of the Extinct Puerto

Rican Parakeet *Psittacara maugéi* Souancé, The Wilson Journal of Ornithology 127 (1), p. 1.

Diagnosis: diagnosed by red (Scarlet 14) carpal edge and red (Scarlet 14) mixed with yellow (Spectrum Yellow 55) on lesser and greater underwing-coverts.

Distribution: extinct around 1900, it occurred on Mona Island and probably Puerto Rico (Juniper & Parr 1998; Olson 2015).

3.7 The *Psittacara wagleri* complex

P. wagleri has been considered polytypic by the majority of authors (Peters 1927, 1937; Forshaw 1989; Arndt 1981; Collar 1997; Juniper & Parr 1998; Forshaw 2010), who considered *A. w. transilis* Peters, 1927 a smaller race from northeastern Venezuela, with darker plumage and red less extensive posteriorly on crown than the nominotypic. Moreover, some of these authors (Peters 1937; Forshaw 1989; Arndt 1981; Collar 1997; Juniper & Parr 1998; Arndt 2006) recognized two further subspecies of *wagleri*: *A. w. minor* Carriker, 1933 from north central Peru and *A. w. frontata* (Cabanis, 1846) from western Ecuador and western Peru; that were considered subspecies of *A. frontata* by Forshaw 2010. The race *A. w. minor* differs from *A. w. frontata* in presenting smaller bill, shorter wing and tail, darker plumage and more extended pale red with yellow edges on crural feathers (Carriker 1933; Juniper & Parr 1998).

Our analysis revealed the existence of only two valid taxa within the *P. wagleri* complex, *P. wagleri* and *P. frontatus*. *P. wagleri* is characterized by dark forehead and red crown, whereas *P. frontatus* presents red on upper area around the eye, forehead, crown, bend of wing, carpal edge, and lesser underwing-coverts. Also, *P. wagleri* occurs simpatrically with *P. leucophthalmus* in western Colombia and northern Venezuela, whereas *P. frontatus* in western Peru.

We did not find significant morphometric differences, except a small difference in wing length (Appendix 5), nor differences in plumage between *A. w. wagleri* and *A. w. transilis*. Therefore, we suggest that *Aratinga wagleri transilis* Peters, 1927 be considered a junior synonym of *Conurus wagleri* Gray, 1845. Similarly, we did not find any significant plumage or morphometric differences between *A. w. frontatus* and *A. w. minor* (Appendix 5), since both races exhibit the same amount of red on crural feathers. Therefore, we here consider *Aratinga wagleri minor* Carriker, 1933 as a junior synonym of *Conurus frontatus* Cabanis, 1846 (Appendix 9).

***Psittacara wagleri* (Gray, 1845)**

Conurus wagleri Gray, 1845. The Genera of Birds, II, pl. 52. Type: BMNH1843.5.24.42, Sante Fe de Bogotá, Leadbetter.

Conurus erythrochlorus Hartlaub, 1849. Revue et Magasin de Zoologie, p. 274.

Psittacara wagleri Bonaparte, 1854. Revue et magasin de Zoologie, n°21, p. 150.

Evopsitta wagleri Bonaparte, 1856. Naumannia, Conspectus Psittacorum n°25.

Conurus wagleri - Salvadori, 1891. Catalogue of the Birds in the British Museum, XX, p. 184.

Aratinga wagleri Brabourne & Chubb, 1912. The Birds of South America, II, p. 82.

Aratinga wagleri transilis Peters, 1927. Proceedings of the New England Zoological Club, IX, p. 111.

Type: MCZ249706, adult male, Tate G. H. H. Clement, 24.ii.1925, Cuchivano, Sucre, Venezuela.

Aratinga wagleri wagleri Peters, 1927. Proceedings of the New England Zoological Club, IX, p. 111.

Diagnosis: characterized by dark red forehead (Maroon 31), red (Scarlet 14) crown, and scattered red (Scarlet 14) feathers on auriculars, upper throat and crural feathers.

Distribution: found in western Colombia and northern Venezuela.

***Psittacara frontatus* (Cabanis, 1846)**

Conurus frontatus Cabanis, 1846 in Tschudi. 1844. Untersuchungen uber die Fauna Peruana, p. 272. Type: ZMB10212, Peru, Philippi Rudolf Amandus.

Evopsitta frontata Bonaparte, 1856. Naumannia, Conspectus Psittacorum n°20.

Conurus frontatus - Salvadori, 1891. Catalogue of the Birds in the British Museum, XX, p. 183.

Aratinga frontatus Brabourne & Chubb, 1912. The Birds of South America, II, p. 81.

Aratinga wagleri minor Carriker, 1933. Proceedings of the Academy of Natural Sciences of Philadelphia, p.3. Type n°24700, holotype: ANSP108178, male, Soquián, Marañon Valley, Dpt. Libertad, Peru, 20.vi.1932, M. A. Carriker, Jr. ,original number 5136.

Aratinga wagleri frontata Peters, 1937. Checklist of Birds of the World, III, p. 187.

Aratinga wagleri minor - Peters, 1937. Checklist of Birds of the World, III, p. 187.

Aratinga frontata frontata Forshaw, 2010. Parrots of the World. A & C Black Publishers Ltd, London, p. 196.

Aratinga frontata minor Forshaw, 2010. Parrots of the World. A & C Black Publishers Ltd, London, p. 196.

Diagnosis: diagnosed by red (Scarlet 14) on upper area around the eye, forehead, crown, bend of wing, carpal edge, lesser underwing-coverts and crural feathers.

Distribution: found from southwestern Ecuador to extreme southern Peru.

3.8 *Psittacara erythrogenys*

P. erythrogenys was first described by Lesson (1844) as *Psittacura erythrogenys*, a parakeet characterized by mainly red head from Ecuador. Nevertheless, ten years later Massena & Souancé (1854) described a similar species from the same locality under the name of *Conurus rubrolarvatus*. This name has been adopted by several authors (Bonaparte 1854; Salvadori 1891; Brabourne & Chubb 1912; Cory 1918), until Peters (1937) replaced it with *erythrogenys* and placed this taxon in the genus *Aratinga*. This classification has been followed by all subsequent authors (Arndt 1981; Forshaw 1989; Collar 1997; Juniper & Parr 1998; Forshaw 2010). Our analysis confirmed that *P. erythrogenys* represents a valid species, characterized by dark red forehead and red area around the eye, crown, nape, cheeks, auriculars, bend of wing, carpal edge and lesser underwing-coverts.

***Psittacara erythrogenys* (Lesson, 1844)**

Psittacura (Psittacus) erythrogenys Lesson, 1844. Echo du Monde Savant, n°123, p. 486. Type: missing. Type locality: Guayaquil, Ecuador.

Conurus rubrolarvatus Massena & Souancé, 1854. Revue et Magasin de Zoologie, p. 71. Type: BMNH1859.11.22.5, Guayaquil, Ecuador, E. Parzudaki.

Psittacara rubrilarvata Bonaparte, 1854. Revue et Magasin de Zoologie, n°27, pp. 147, 150.

Psittacara erythrogenys Souancé, 1856. Revue et Magasin de Zoologie, p. 59.

Evopsitta erythrogenys Bonaparte, 1856. Naumannia, 1856, Conspectus Psittacorum n° 27.

Conurus erythrogenys Gray, 1859. List of the Specimens of Birds in the British Museum, III, p. 34.

Conurus rubrolarvatus - Salvadori, 1891. Catalogue of the Birds in the British Museum, XX, p. 182.

Aratinga rubrolarvatus Brabourne & Chubb, 1912. The Birds of South America, I, p. 81.

Aratinga rubrolarvata Cory, 1918. Catalogue of the Birds of the Americas, p. 57.

Aratinga erythrogenys Peters, 1937. Checklist of Birds of the World, III, p. 187.

Diagnosis: characterized by dark red (Maroon 31) forehead; red (Scarlet 14) area around the eye, crown, nape, cheeks, auriculars, bend of wing, carpal edge, lesser underwing-coverts; and scattered red (Scarlet 14) feathers on upper throat and crural feathers.

Distribution: occurs from Manabí, northwest Ecuador, south to Lambayeque and Cajamarca, northwest Peru, with the high Andes marking its easternmost limit.

3.9 The *Psittacara mitratus* complex

P. mitratus has been considered polytypic by several authors (Chapman 1921; Peters 1937; Arndt 1981; Forshaw 1989; Collar 1997; Juniper & Parr 1998) who recognized two subspecies: *A. m. mitrata* and *A. m. alticola*. The latter differs from nominate in being darker, with narrower frontal band, few red feathers on cheeks and green crural feathers. In 2006, Arndt revised the *A. mitrata* complex and described two new subspecies, *A. m. chlorogenys* and *A. m. tucumana* and one new species, *A. hockingi*. Also, he elevated *alticola* at species level. *A. m. chlorogenys* is similar to nominate, but exhibits a not closed narrow ring of small red feathers around the eye, a red frontal band extending to the eye and lores, red thighs and blue tinge on crown. *A. m. tucumana* presents paler plumage; red frontal band extending to eye and lores; continuous ring of red feathers around the eye; red cheeks and crural feathers; and scattered red feathers on throat, abdomen, back and mainly nape. On the other hand, *A. hockingi* is diagnosed by a restricted half-moon-shaped red frontal band, green area around the eye and crural feathers; and occurs sympatrically with *A. alticola*, that presents shorter wing and bluish overall plumage (Arndt 2006).

Our analysis did not reported any significant morphometric differences among the taxa belonging to the *A. mitrata* complex (Appendix 5). Moreover, based on plumage analysis, we recognize three valid species: *P. mitratus*, *P. chlorogenys* and *P. alticolus*. We elevate *A. m. mitrata* at species level, since it is the only taxon within the complex the presents mostly red head. It occurs sympatrically with *P. leucophthalmus* in Bolivia and north Argentina.

Furthermore, as already suggested by Agnolin (2009), we could not find clear differences in plumage between *A. m. mitrata* and *A. m. tucumana*, since *tucumana* does not present paler plumage or marked differences in the extension of red on cheeks, auriculars and crown. Therefore, we here consider *Aratinga mitrata tucumana* Arndt, 2006 a junior synonym of *Conurus mitratus* Tschudi, 1844.

Also, we elevate *A. m. chlorogenys* at species level, since it exhibits red restricted to part of

crown and scattered red feathers on area around the eye, cheeks and auriculars (Appendix 10). We found that both *A. m. chlorogenys* and *A. hockingi* present a red frontal band extending to part of the crown; red crural feathers; scattered red feathers on area around the eye, cheeks, auriculars, upper throat and dorsal neck; and can exhibit blue tinge on crown. Accordingly, we suggest that *Aratinga hockingi* Arndt, 2006 be considered a junior synonym of *Aratinga mitrata chlorogenys* Arndt, 2006.

Finally, regarding *A. alticola*, we agree with Arndt (2006) that it represents a separate species. However, in our opinion *P. alticolus* is characterized by a narrow dark red and red frontal band, few scattered red feathers around the eye and on cheeks, green crural feathers and it lacks bluish plumage (Appendix 11). Also, it occurs simpatrically with *P. chlorogenys* in south Peru.

***Psittacara mitratus* (Tschudi, 1844)**

Conurus mitratus Tschudi, 1844. Archiv für Naturgeschichte, X, n°258, p. 304. Type: USNM41926, Beron, Argentina, M. Tschudi.

Psittacara mitrata Bonaparte, 1854. Revue et Magasin de Zoologie, n°24, p. 150.

Evopsitta mitrata Bonaparte, 1856. Naumannia, Consepctus Psittacorum n° 20.

Conurus mitratus - Salvadori, 1891. Catalogue of the Birds in the British Museum, XX, p. 181.

Aratinga mitratus Brabourne & Chubb, 1912. The Birds of South America, II, p. 81.

Aratinga mitrata Cory, 1918. Catalogue of the Birds of the Americas, p. 57.

Aratinga mitrata mitrata Peters, 1937. Checklist of Birds of the World, III, p. 187.

Aratinga mitrata tucumana Arndt, 2006. A revision of the *Aratinga mitrata* complex, with the description of one new species, two new subspecies, and species-level status of *Aratinga alticola*. *J. Ornithology*, 147, p. 77. Type: AMNH474347, male, 9.viii.1898, Tucuman, Argentina, Bosques, Dinelli collection.

Diagnosis: characterized by dark red (Maroon 31) and red (Scarlet 14) forehead, red (Scarlet 14) area around the eye, part of crown, cheeks and crural feathers. It presents scattered red (Scarlet 14) feathers on auriculars, upper throat, throat and dorsal neck. It can exhibit blue (Cerulean Blue 67) tinge on crown.

Distribution: ranges from south Peru, through central Bolivia, to northwestern Argentina.

***Psittacara chlorogenys* (Arndt, 2006)**

Aratinga mitrata chlorogenys Arndt, 2006. A revision of the *Aratinga mitrata* complex, with the description of one new species, two new subspecies, and species-level status of *Aratinga alticola*. *J. Ornithology*, 147, p. 74. Type: AMNH235434, male, San Pedro, 8600-9400 ft, south of Chachapoyas, Peru, 2.ii.1926, Watkins.

Aratinga hockingi Arndt, 2006. A revision of the *Aratinga mitrata* complex, with the description of one new species, two new subspecies, and species-level status of *Aratinga alticola*. *J. Ornithology*, 147, p. 78. Type: FMNH59546, female, Chinchao, Huanuco, Peru, 22.x.1922, 5700 feet, J. T. Zimmer.

Diagnosis: diagnosed by dark red (Maroon 31) forehead; red (Scarlet 14) on part of crown, crural feathers and scattered red (Scarlet 14) feathers on area around the eye, cheeks, auriculars, dorsal neck and upper throat. It can exhibit blue (Cerulean Blue 67) tinge on crown.

Distribution: can be found in Peru, on the mountains east of Utcubamba Valley and Chachapoyas in the department Amazonas; northern Cajamarca, Carpish mountains and ridge south of the upper Huallaga river; and in the departments of Huanuco, Junin, Ayacucho and Cusco (Arndt, 2006).

***Psittacara alticolus* (Chapman, 1921)**

Aratinga mitrata alticola Chapman, 1921. Bulletin of the United States Natural History Museum, n° 117, p. 62. Type: AMNH129136, male, Cuzco, Peru, 11.000 feet, 16.xi.1914, H. and C. Watkins.

Aratinga alticola Arndt, 2006. A revision of the *Aratinga mitrata* complex, with the description of one new species, two new subspecies, and species-level status of *Aratinga alticola*. *J. Ornithology*, 147, p. 78.

Diagnosis: characterized by a dark red (Maroon 31) and red (Scarlet 14) restricted band on forehead, and few scattered red (Scarlet 14) feathers around the eye and on cheeks.

Distribution: only known from the area around Anco, in the department of Huancavelica, near Cusco, Peru and in Cochacamba, Bolivia (Arndt, 2006).

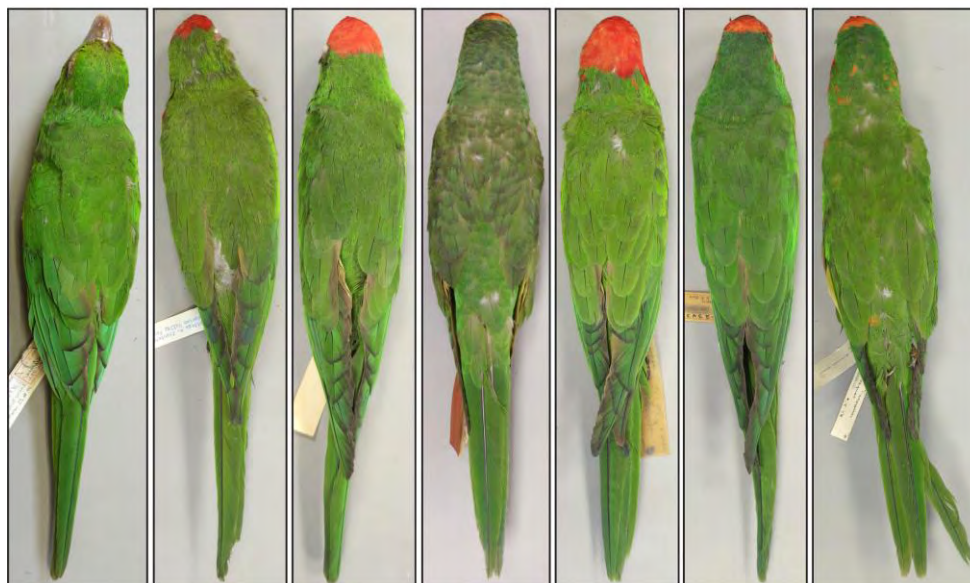
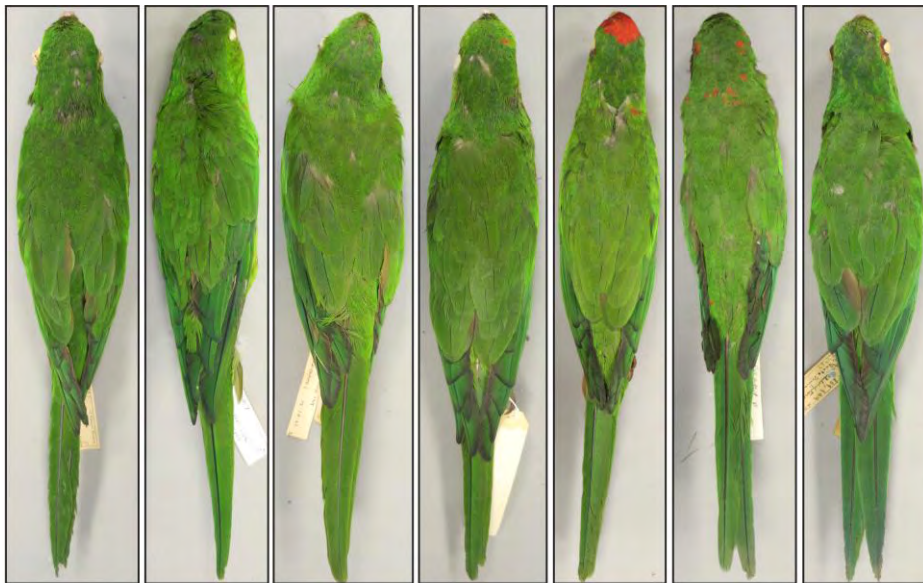


Figure 1. Dorsal view of the 14 species of *Psittacara* showing that they all exhibit green scapulars, folded secondaries, uppertail; and mainly green with black edges secondaries. From top left to bottom right: *P. leucophthalmus* (Statius Muller, 1776), *P. holochlorus* (Sclater, 1859), *P. brevipes* (Lawrence, 1871), *P. rubritorquis* (Sclater, 1887), *P. finschi* (Salvin, 1871), *P. euops* (Wagler, 1832), *P. chloropterus* (Souancé, 1856), *P. maugei* (Souancé, 1856), *P. wagleri* (Gray, 1845), *P. frontatus* (Cabanis, 1846), *P. alticolus* (Arndt, 2006), *P. erythrogenys* (Lesson, 1844), *P. chlorogenys* (Arndt, 2006), *P. mitratus* (Tschudi, 1844).



Figure 2. Frontal view of the 14 species of *Psittacara*, showing that they all present flesh color tarsus and grayish-olive undertail. From top left to bottom right: *P. leucophthalmus* (Statius Muller, 1776), *P. holochlorus* (Sclater, 1859), *P. brevipes* (Lawrence, 1871), *P. rubritorquis* (Sclater, 1887), *P. finschi* (Salvin, 1871), *P. euops* (Wagler, 1832), *P. chloropterus* (Souancé, 1856), *P. maugei* (Souancé, 1856), *P. wagleri* (Gray, 1845), *P. frontatus* (Cabanis, 1846), *P. alticolus* (Arndt, 2006), *P. erythrogegens* (Lesson, 1844), *P. chlorogenys* (Arndt, 2006), *P. mitratus* (Tschudi, 1844).

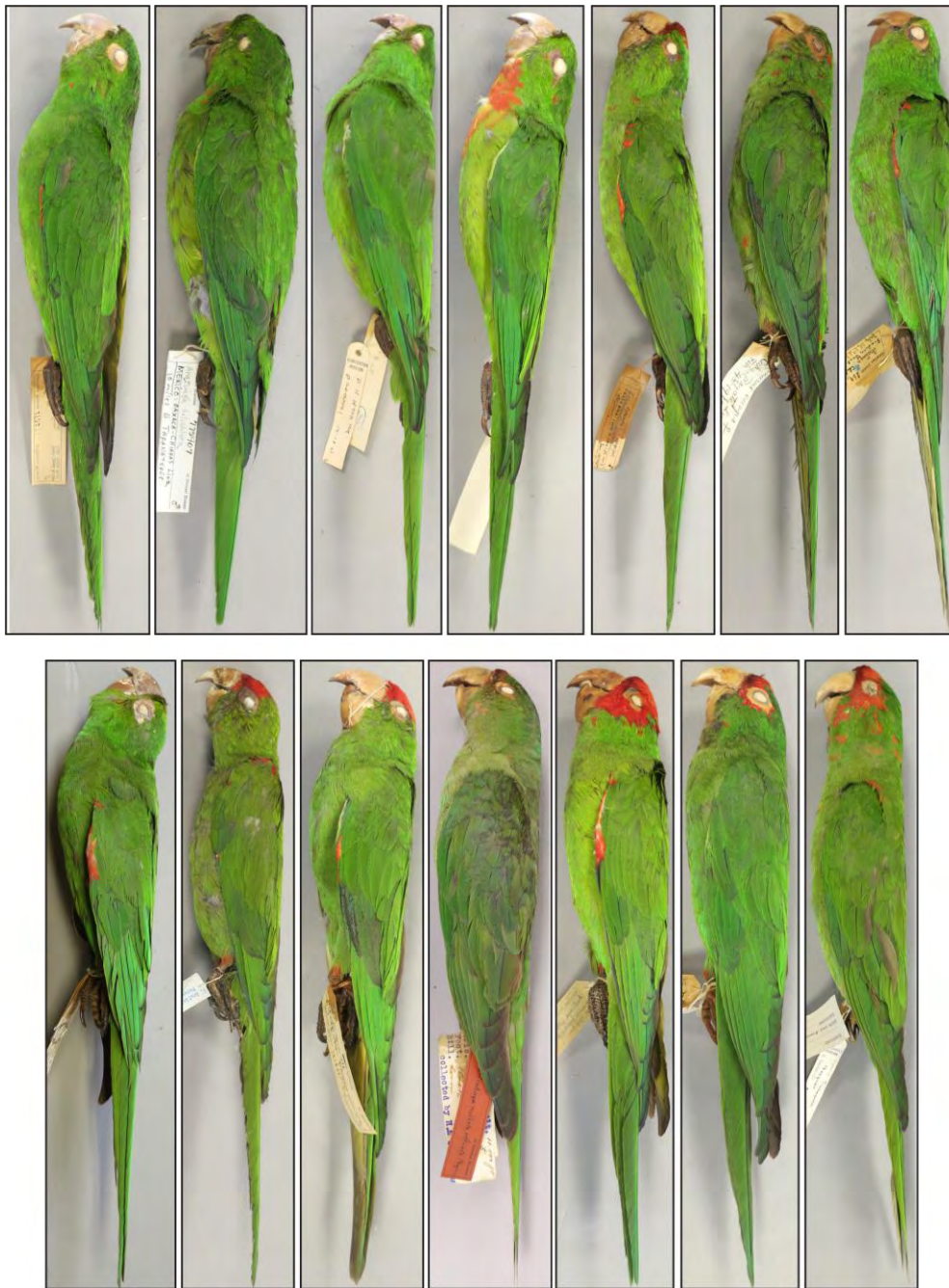


Figure 3. Lateral view of the 14 species of *Psittacara*, showing that they all exhibit white periophthalmic ring; green median wing-coverts, greater primary-coverts, greater secondary-coverts and mainly green with black edges primaries and secondaries. From top left to bottom right: *P. leucophthalmus* (Statius Muller, 1776), *P. holochlorus* (Sclater, 1859), *P. brevipes* (Lawrence, 1871), *P. rubritorquis* (Sclater, 1887), *P. finschi* (Salvin, 1871), *P. euops* (Wagler, 1832), *P. chloropterus* (Souancé, 1856), *P. maugéi* (Souancé, 1856), *P. wagleri* (Gray, 1845), *P. frontatus* (Cabanis, 1846), *P. alticolus* (Arndt, 2006), *P. erythrogegens* (Lesson, 1844), *P. chlorogeens* (Arndt, 2006), *P. mitratus* (Tschudi, 1844).

3.10 Morphometric analyses

All analyses were performed first with the 22 taxa reported in the literature (Appendix 5) and second with the 14 species here proposed. Here are reported only results after the taxonomic revision. Data were not normally distributed, since the p-value in the Shapiro-Wilk test resulted to be less than the chosen alpha level (0.05), therefore a non parametric Fligner-Killeen test was performed, that reported that all variances were not homogeneous. In order to test for sexual dimorphism, a Kruskal-Wallis test was performed and reported significant differences in exposed culmen (p-value= 0.002) and wing length (p-value= 0.006). Particularly, culmen seems to be longer in males of *P. leucophthalmus* (p-value= 0.001), *P. brevipes* (p-value=0.046), *P. holochlorus* (p-value= 0.007) and *P. mitratus* (p-value= 0.037). Wing is longer in males of *P. leucophthalmus* (p-value= 0.002) and *P. chlorogenys* (p-value=0.025).

Significant morphometric differences were found in the Kruskal-Wallis test for all measurements, therefore a pairwise comparisons using Wilcoxon rank sum was performed between pairs of taxa (Table 1). *P. euops* seems to be the smallest species within the genus, whereas *P. chlorogenys* and *P. mitratus* are the largest (Table 2). Moreover, the lack of significant differences between *P. alticolus* and several other taxa is probably due to the small number (3 skins) of examined specimens.

In the principal component analysis (PCA) the first two principal components explained 90% of the variance between all taxa (Eigenvalue—90.8%). Particularly, the first component (79.49%) refers to culmen length and bill width; whereas the second (11.31%) refers to tarsus and culmen length. As we can see in the graph (Figure 5), the PCA showed overlap between all species, except for *P. euops*.

Table 1. Pairwise comparisons between pairs of taxa using Wilcoxon rank sum test for 4 morphometric parameters. Ns = no significant difference; <0.05 = significant difference.

Taxa	Culmen	Bill width	Wing	Tarsus
<i>leucophthalmus-alticolus</i>	Ns	Ns	Ns	Ns
<i>leucophthalmus-brevipes</i>	<0.0001	<0.05	Ns	Ns
<i>leucophthalmus-chlorogenys</i>	<0.0001	<0.0001	<0.0001	<0.05
<i>leucophthalmus-chloropterus</i>	Ns	<0.0001	Ns	<0.0001
<i>leucophthalmus-maugei</i>	Ns	Ns	Ns	Ns
<i>leucophthalmus-erythrogyens</i>	<0.05	<0.0001	<0.05	<0.0001
<i>leucophthalmus-euops</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>leucophthalmus-finschi</i>	Ns	Ns	<0.0001	<0.0001
<i>leucophthalmus-frontatus</i>	<0.0001	<0.0001	<0.0001	<0.05
<i>leucophthalmus-holochlorus</i>	Ns	<0.0001	<0.0001	<0.0001

Taxa	Culmen	Bill width	Wing	Tarsus
<i>leucophthalmus-mitratus</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>leucophthalmus-rubritorquis</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>leucophthalmus-wagleri</i>	<0.05	<0.05	<0.0001	Ns
<i>alticolus-brevipes</i>	Ns	Ns	Ns	Ns
<i>alticolus-chlorogenys</i>	Ns	Ns	Ns	Ns
<i>alticolus-chloropterus</i>	Ns	Ns	Ns	Ns
<i>alticolus-maugei</i>	Ns	Ns	Ns	Ns
<i>alticolus-erythrogenys</i>	Ns	Ns	Ns	Ns
<i>alticolus-euops</i>	Ns	Ns	Ns	Ns
<i>alticolus-finschi</i>	<0.05	Ns	Ns	Ns
<i>alticolus-frontatus</i>	Ns	Ns	Ns	Ns
<i>alticolus-holochlorus</i>	Ns	Ns	Ns	Ns
<i>alticolus-mitratus</i>	Ns	Ns	Ns	Ns
<i>alticolus-rubritorquis</i>	Ns	Ns	Ns	Ns
<i>alticolus-wagleri</i>	Ns	Ns	Ns	Ns
<i>brevipes-chlorogenys</i>	<0.0001	<0.0001	<0.0001	<0.05
<i>brevipes-chloropterus</i>	<0.05	<0.0001	Ns	<0.05
<i>brevipes-maugei</i>	Ns	Ns	Ns	Ns
<i>brevipes-erythrogenys</i>	Ns	Ns	Ns	Ns
<i>brevipes-euops</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>brevipes-finschi</i>	<0.0001	Ns	<0.0001	Ns
<i>brevipes-frontatus</i>	<0.05	<0.05	<0.0001	Ns
<i>brevipes-holochlorus</i>	<0.0001	<0.0001	<0.05	Ns
<i>brevipes-mitratus</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>brevipes-rubritorquis</i>	<0.0001	<0.0001	<0.0001	<0.05
<i>brevipes-wagleri</i>	Ns	Ns	<0.0001	Ns
<i>chlorogenys-chloropterus</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>chlorogenys-maugei</i>	<0.05	<0.05	Ns	Ns
<i>chlorogenys-erythrogenys</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>chlorogenys-euops</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>chlorogenys-finschi</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>chlorogenys-frontatus</i>	Ns	<0.05	Ns	Ns
<i>chlorogenys-holochlorus</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>chlorogenys-mitratus</i>	Ns	Ns	Ns	Ns
<i>chlorogenys-rubritorquis</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>chlorogenys-wagleri</i>	<0.0001	<0.0001	<0.0001	<0.05
<i>chloropterus-maugei</i>	Ns	Ns	Ns	Ns
<i>chloropterus-erythrogenys</i>	Ns	<0.0001	Ns	Ns
<i>chloropterus-euops</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>chloropterus-finschi</i>	Ns	<0.05	<0.0001	Ns
<i>chloropterus-frontatus</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>chloropterus-holochlorus</i>	Ns	Ns	Ns	Ns
<i>chloropterus-mitratus</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>chloropterus-rubritorquis</i>	<0.05	Ns	<0.0001	Ns
<i>chloropterus-wagleri</i>	Ns	<0.0001	<0.0001	<0.0001
<i>erythrogenys-maugei</i>	Ns	Ns	Ns	Ns
<i>erythrogenys-euops</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>erythrogenys-finschi</i>	<0.0001	<0.05	<0.05	Ns
<i>erythrogenys-frontatus</i>	<0.05	<0.05	<0.0001	<0.05
<i>erythrogenys-holochlorus</i>	<0.0001	<0.0001	Ns	Ns

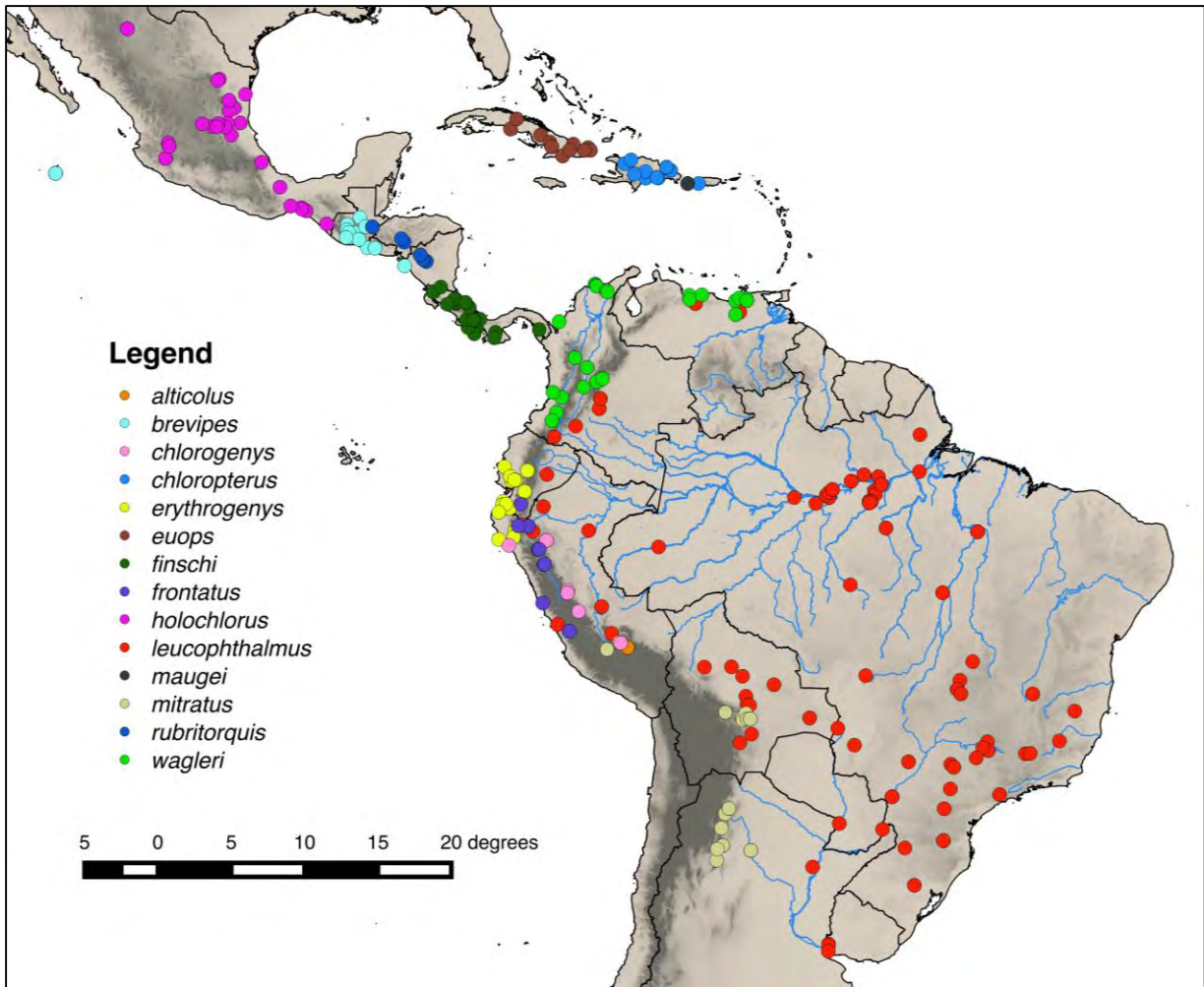
Taxa	Culmen	Bill width	Wing	Tarsus
<i>erythrogegens –mitratus</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>erythrogegens –rubritorquis</i>	<0.0001	<0.0001	<0.0001	<0.05
<i>erythrogegens –wagleri</i>	Ns	Ns	<0.0001	<0.05
<i>euops-maugei</i>	<0.05	<0.05	<0.05	<0.05
<i>euops –finschi</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>euops –frontatus</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>euops –holochlorus</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>euops –mitratus</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>euops –rubritorquis</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>euops –wagleri</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>finschi-maugei</i>	Ns	Ns	Ns	Ns
<i>finschi –frontatus</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>finschi –holochlorus</i>	Ns	<0.05	<0.05	Ns
<i>finschi –mitratus</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>finschi –rubritorquis</i>	Ns	<0.05	Ns	Ns
<i>finschi –wagleri</i>	<0.05	<0.05	<0.0001	<0.0001
<i>frontatus-maugei</i>	Ns	<0.05	<0.05	Ns
<i>frontatus –holochlorus</i>	<0.0001	<0.0001	<0.0001	<0.05
<i>frontatus –mitratus</i>	<0.05	<0.05	Ns	Ns
<i>frontatus –rubritorquis</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>frontatus –wagleri</i>	<0.05	<0.05	<0.0001	Ns
<i>holochlorus-maugei</i>	Ns	Ns	Ns	Ns
<i>holochlorus –mitratus</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>holochlorus –rubritorquis</i>	<0.05	Ns	<0.0001	Ns
<i>holochlorus –wagleri</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>mitratus-maugei</i>	<0.05	<0.05	<0.05	Ns
<i>mitratus –rubritorquis</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>mitratus –wagleri</i>	<0.0001	<0.0001	<0.0001	<0.05
<i>rubritorquis-maugei</i>	Ns	Ns	Ns	Ns
<i>rubritorquis-wagleri</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>wagleri-maugei</i>	Ns	Ns	Ns	Ns

Table 2. Morphological measurements (mm) as mean and standard deviation (first row) and minimum and maximum values (second row) for male and female of each the 14 recognized taxa.

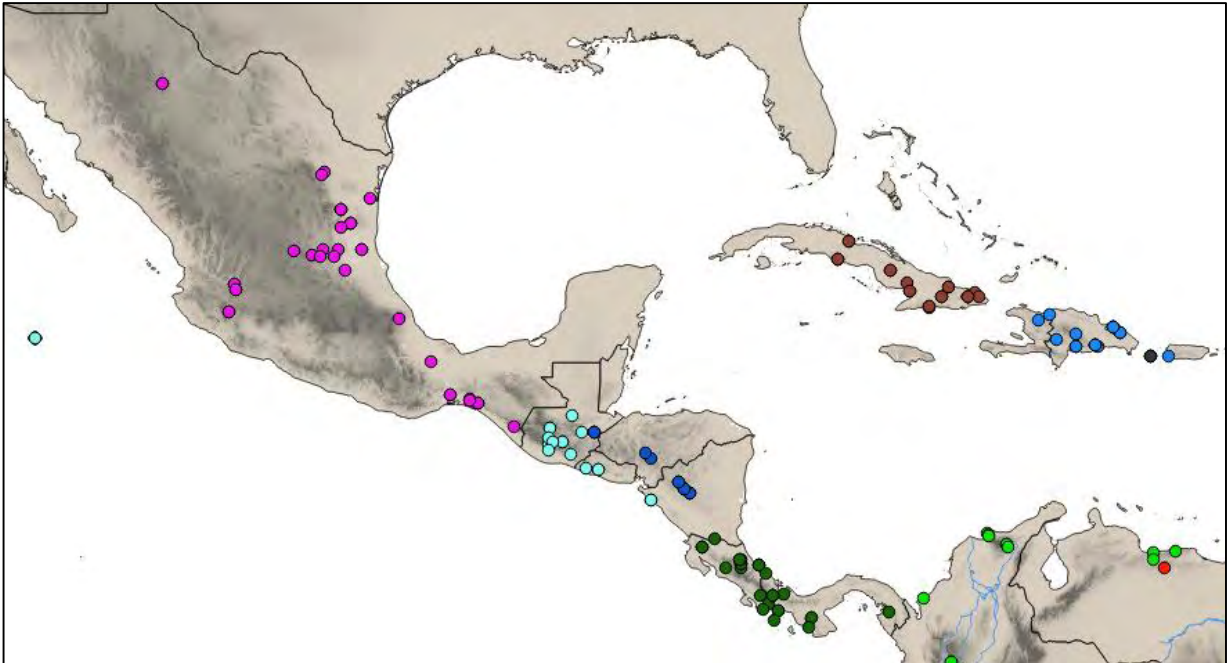
Taxa	Bill width M	Bill width F	Culmen M	Culmen F	Wing M	Wing F	Tarsus M	Tarsus F
<i>leucophthalmus</i>	15.62±0.85 (13.88-18.25)	15.33±0.87 (13.54-17.58)	25.76±1.77 (17.06-31.18)	25.19±1.50 (22.21-30.25)	173.4±6.32 (156-188)	171.2±6.43 (152-188)	17.53±0.94 (14.19-20.19)	17.57±0.96 (15.16-20.47)
<i>holochlorus</i>	14.78±0.73 (13.20-15.90)	14.46±0.42 (13.61-15.41)	25.41±0.93 (23.81-27.59)	24.68±0.76 (23.04-26.74)	167.2±4.51 (158-175)	164.8±5.31 (154-175)	16.59±1.22 (14.21-20.30)	16.52±1.04 (14.63-18.92)
<i>brevipes</i>	16.23±0.59 (14.80-17.27)	15.84±0.48 (14.29-16.61)	27.49±1.04 (25.16-29.48)	26.78±1.13 (23.97-28.73)	170.3±5.85 (160-184)	171.9±7.32 (161-186)	17.35±1.32 (15.31-20.51)	17.07±1.43 (14.20-19.37)
<i>rubritorquis</i>	14.11±0.78 (12.58-15.35)	14.28±0.50 (13.62-15.03)	24.26±0.69 (22.97-25.16)	23.70±1.04 (22.29-26.04)	157±7.41 (146-175)	156.5±5.50 (150-164)	15.46±0.92 (13.86-16.93)	16.08±1.01 (14.49-18.61)
<i>finschi</i>	15.05±1.10 (13.09-17.10)	15.77±0.93 (11.12-13.81)	24.94±1.28 (22.83-26.78)	25.15±1.33 (23.43-28.07)	161.3±5.63 (150-170)	159.8±5.99 (152-170)	16.74±0.71 (15.06-18.04)	16.19±0.66 (14.79-17.24)
<i>euops</i>	12.72±0.41 (12-13.46)	12.50±0.20 (12.13-12.86)	19.18±0.60 (18.23-20.29)	19.02±0.47 (18.36-20.16)	136.5±3.16 (132-144)	136.1±3.81 (127-143)	14.19±0.75 (12.16-15.29)	14±0.84 (12.75-15.40)
<i>chloropterus</i>	14.62±0.85 (13.30-17.03)	14.54±0.67 (13.10-15.85)	26.05±1.79 (22.89-28.89)	25.46±0.91 (23.96-26.93)	170.3±5.56 (162-183)	168.3±4.35 (160-175)	16.45±1.23 (13.64-19.67)	16.15±0.84 (14.37-18)
<i>maugei</i>	15.71 only 1 male	14.66±0.93 (13.68-15.55)	24.79 only 1 male	25.07±1.08 (24.30-26.31)	174 only 1 male	166.7±5.77 (160-170)	18.16 only 1 male	16.60±0.22 (16.35-16.80)
<i>wagleri</i>	16.01±0.85 (14.34-17.98)	16.39±0.68 (15.08-17.76)	26.39±1.24 (23.66-28.11)	26.37±1.33 (24.03-28.49)	178.4±6.27 (168-190)	177.1±5.63 (165-186)	17.65±1.26 (14.93-19.82)	17.72±1.24 (15.17-19.32)
<i>frontatus</i>	17.46±1.10 (15.98-19.11)	17.15±NA (16.57-17.88)	29.59±2.19 (27.27-32.68)	28.49±1.54 (27.33-31.09)	207.8±16.3 2(183-230)	205.6±10.7 8(193-222)	19.19±1.87 (16.30-21.55)	17.57±0.94 (16.30-18.53)
<i>alticolus</i>	18.2 only 1 male	17.06±1.09 (16.28-17.83)	28.16 only 1 male	28.52±0.18 (28.39-28.65)	194 only 1 male	188 only 2 females	17.73 only 1 male	17.73 only 2 females
<i>erythrogenys</i>	16.22±0.33 (15.62-16.62)	16.47±0.56 (15.10-17.27)	28±1.57 (26.07-30.54)	26.89±1.21 (24.90-29.45)	171.5±6.36 (165-180)	166.9±3.87 (160-174)	17.04±0.89 (16.15-18.80)	16.62±0.95 (14.09-18.62)

Taxa	Bill width M	Bill width F	Culmen M	Culmen F	Wing M	Wing F	Tarsus M	Tarsus F
<i>chlorogenys</i>	18.39±0.42 (17.90-19.03)	17.96±0.49 (17.44-18.71)	31.16±1.08 (29.89-32.84)	30.23±0.69 (29.07-31.02)	201±4.72 (191-205)	195.8±5.45 (185-200)	19.36±0.81 (18.21-20.38)	18.64±0.99 (17.48-20.12)
<i>mitratus</i>	18.48±0.75 (17.53-20)	17.94±0.50 (17.42-19.02)	31.41±1.01 (29.13-32.90)	30.42±1.19 (28.86-32.96)	200.8±5.90 (192-212.2)	198.9±6.34 (187-210)	19.12±0.85 (17.48-20.92)	19.07±1.05 (17.32-20.67)

(A)



(B)



(C)

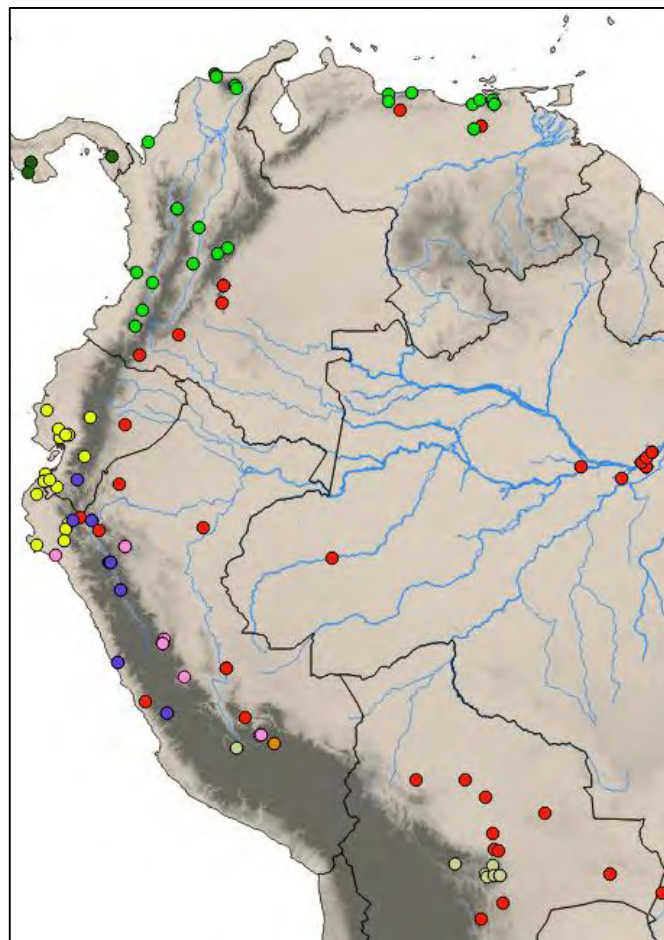


Figure 4. (A), (B), (C) Distribution of analyzed specimens of *Psittacara* with locality information on label. Light purple: *P. holochlorus*, light blue: *P. brevipes*, dark blue: *P. rubritorquis*, dark green: *P. finschi*, brown: *P. euops*, blue: *P. chloropterus*, black: *P. maugei*, light green: *P. wagleri*, yellow: *P. erythrogegens*, purple: *P. frontatus*, pink: *P. chlorogenys*, orange: *P. alticolus*, red: *P. leucophthalmus*, beige: *P. mitratus*.

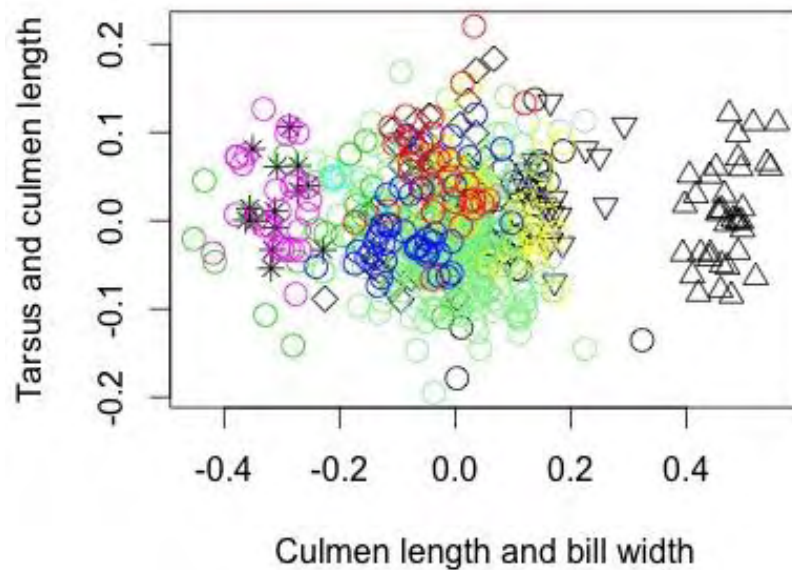


Figure 5. Results of the principal component analysis (Eigenvalue-90.8%). Red circles: *P. erythrogenys*, blue circles: *P. wagleri*, black circles: *P. holochlorus*, gray circles: *P. chloropterus*, yellow circles: *P. finschi*, light green circles: *P. leucophthalmus*, light blue circles: *P. alticolus*, purple circles: *P. mitratus*, green circles: *P. frontatus*, black triangles: *P. euops*, black stars: *P. chlorogenys*, black crosses: *P. maugei*, reverse triangles: *P. rubritorquis*, diamonds: *P. brevipes*.

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APPENDICES

Appendix 1. List of examined skins, where “NA” indicates missing information.

Taxon	Number	Sex	Country	State/Region	Locality
<i>callogenys</i>	BMNH1889.1.30.81	NA	Ecuador	NA	Sarayacu
<i>callogenys</i>	AMNH281411	M	Brazil	Amazonas	Rosarinho. Lago Vampaio. R.Madeira
<i>callogenys</i>	AMNH283272	M	Brazil	NA	Faro. Rio Paratucatu'. Rio Amazon. N bank
<i>callogenys</i>	AMNH239764	NA	Peru	NA	Boca Rio Urubamba
<i>callogenys</i>	AMNH239757	NA	Peru	NA	Boca Rio Urubamba
<i>callogenys</i>	AMNH181193	M	Peru	Cajamarca	Chaupe. 6100 ft
<i>callogenys</i>	AMNH406875	NA	Peru	NA	Boca Rio Urubamba
<i>leucophthalmus</i>	AMNH474397	M	Bolivia	NA	Province of Sara
<i>callogenys</i>	AMNH283271	M	Brazil	NA	Faro. Rio Paratucatu'. Rio Amazon. N bank
<i>callogenys</i>	AMNH185210	M	NA	NA	San José Alajo
<i>callogenys</i>	AMNH283279	F	Brazil	NA	Faro. Rio Paratucatu'. Rio Amazon. N bank
<i>callogenys</i>	USNM273074	M	Peru	NA	Rio Cosireni
<i>callogenys</i>	USNM334152	F	captivity	NA	NA
<i>callogenys</i>	USNM16651	NA	NA	NA	NA
<i>callogenys</i>	USNM445967	F	Colombia	Caquetá	Venecia
<i>callogenys</i>	FMNH248525	M	Colombia	Meta	San Juan de Arama
<i>callogenys</i>	FMNH249392	M	Colombia	Meta	San Juan de Arama
<i>callogenys</i>	FMNH249391	M	Colombia	Meta	San Juan de Arama
<i>callogenys</i>	FMNH248523	M	Colombia	Meta	San Juan de Arama
<i>callogenys</i>	FMNH249393	F	Colombia	Meta	La Macarena. Rio Guapuya
<i>callogenys</i>	FMNH248521	M	Colombia	Meta	La Macarena. Rio Guapuya
<i>callogenys</i>	FMNH248527	M	Colombia	Meta	San Juan de Arama
<i>callogenys</i>	FMNH286591	M	Peru	Loreto	Liberal. Canal de Puinahua. Rio Ucayali
<i>propinquus</i>	BMNH1890.6.1.38	NA	Brazil	SE	NA
<i>leucophthalmus</i>	AMNH313930	F	Brazil	Santa Catarina	Ilha Redonda
<i>leucophthalmus</i>	AMNH769468	NA	Argentina	Misiones	Arroyo Uruguay. km 30
<i>leucophthalmus</i>	AMNH318250	F	Brazil	Parana'	Tibagy. Faz. Monte Alegre
<i>leucophthalmus</i>	AMNH313929	M	Brazil	Santa Catarina	Ouro Verde. Serra do Lucindo. 2550 feet
<i>leucophthalmus</i>	AMNH313928	F	Brazil	Santa Catarina	Ouro Verde. Serra do Lucindo. 2550 feet
<i>leucophthalmus</i>	AMNH313927	NA	Brazil	Santa Catarina	Ouro Verde. Serra do Lucindo. 2550 feet
<i>leucophthalmus</i>	AMNH313926	NA	Brazil	Santa Catarina	Ouro Verde. Serra do Lucindo. 2550 feet
<i>leucophthalmus</i>	AMNH313925	F	Brazil	Santa Catarina	Ouro Verde. Serra do Lucindo. 2550 feet
<i>leucophthalmus</i>	AMNH313933	F	Brazil	Rio Grande do Sul	Santa Cruz. 300 feet
<i>leucophthalmus</i>	AMNH313932	NA	Brazil	Rio Grande do Sul	Santa Cruz. 300 feet
<i>leucophthalmus</i>	USNM388471	F	Venezuela	Anzoategui	Cantaura
<i>leucophthalmus</i>	USNM121056	M	NA	NA	NA

<i>leucophthalmus</i>	USNM16558	NA	NA	NA	NA
<i>leucophthalmus</i>	USNM24103	NA	Brazil	Santa Catarina	NA
<i>leucophthalmus</i>	USNM177632	F	Brazil	NA	Ribeirão do Brugue
<i>leucophthalmus</i>	USNM515473	M	Brazil	Amapá	Serra do Navio
<i>leucophthalmus</i>	USNM406466	F	Venezuela	Anzoategui	Cantaura
<i>leucophthalmus</i>	USNM20945	NA	Brazil	Paraná	NA
<i>leucophthalmus</i>	USNM51091	NA	Brazil	NA	NA
<i>leucophthalmus</i>	USNM390722	F	NA	NA	NA
<i>leucophthalmus</i>	FMNH152011	F	Paraguay	Italia	Villeta
<i>leucophthalmus</i>	FMNH152010	M	Paraguay	Italia	Villeta
<i>leucophthalmus</i>	FMNH295973	M	Bolivia	Santa Cruz	Santiago Chiq.
<i>leucophthalmus</i>	FMNH179096	M	Bolivia	Santa Cruz	Rio Surutu'
<i>leucophthalmus</i>	FMNH179095	F	Bolivia	Santa Cruz	Buenavista
<i>leucophthalmus</i>	FMNH295974	F	Bolivia	Santa Cruz	Santiago Chiq.
<i>leucophthalmus</i>	FMNH334958	M	Bolivia	Santa Cruz	Nuflo de Chavez. Estancia Las Madres. 8 rd km N Concepcion
<i>leucophthalmus</i>	FMNH293585	F	Bolivia	Hernando Silez	Chuquisaca. 16 km N Monteagudo
<i>leucophthalmus</i>	MNHN1992	NA	Argentina	NA	Trois Sants
<i>leucophthalmus</i>	MNHN246	M	Argentina	NA	Ocampo. Santa Fe
<i>callogenys</i>	MZUSP16491	F	Brazil	Amazonas	Manacapuru. Rio Solimões
<i>leucophthalmus</i>	MZUSP20505	F	Brazil	Amazonas	R. Amazonas (Norte). Lago Serpa
<i>leucophthalmus</i>	MZUSP20830	F	Brazil	Amazonas	R. Amazonas (Norte). Itacoatiara
<i>leucophthalmus</i>	MZUSP20931	F	Brazil	Amazonas	R. Amazonas (Norte). Itacoatiara
<i>leucophthalmus</i>	MZUSP20936	F	Brazil	Amazonas	R. Amazonas (Norte). Itacoatiara
<i>leucophthalmus</i>	MZUSP21004	M	Brazil	Amazonas	R. Amazonas (Norte). Itacoatiara
<i>callogenys</i>	MZUSP21297	M	Brazil	Amazonas	R. Amazonas (Sul). Lago do Baptista
<i>callogenys</i>	MZUSP21298	F	Brazil	Amazonas	R. Amazonas (Sul). Lago do Baptista
<i>callogenys</i>	MZUSP21754	NA	Brazil	Amazonas	R. Amazonas (Norte). Lago Serpa
<i>callogenys</i>	MZUSP22296	M	Brazil	Amazonas	R. Amazonas (Sul). Lago do Baptista
<i>leucophthalmus</i>	MZUSP22297	F	Brazil	Amazonas	R. Amazonas (Norte). Itacoatiara
<i>callogenys</i>	MZUSP22298	F	Brazil	Amazonas	R. Amazonas (Norte). Lago Serpa
<i>callogenys</i>	MZUSP22300	M	Brazil	Amazonas	R. Amazonas (Norte). Lago do Canaçari
<i>leucophthalmus</i>	MZUSP22301	F	Brazil	Amazonas	R. Amazonas (Norte). Itacoatiara
<i>callogenys</i>	MZUSP22303	F	Brazil	Amazonas	R. Amazonas (Sul). Lago do Baptista
<i>leucophthalmus</i>	MZUSP22305	F	Brazil	Amazonas	R. Amazonas (Norte). Itacoatiara
<i>callogenys</i>	MZUSP22307	F	Brazil	Amazonas	R. Amazonas (Sul). Lago do Baptista
<i>callogenys</i>	MZUSP22308	M	Brazil	Amazonas	R. Amazonas (Sul). Lago do Baptista
<i>callogenys</i>	MZUSP22487	M	Brazil	Amazonas	R. Amazonas (Sul). Lago do Baptista
<i>leucophthalmus</i>	MZUSP22488	M	Brazil	Amazonas	R. Amazonas (Norte). Itacoatiara
<i>callogenys</i>	MZUSP23566	M	Brazil	Amazonas	R. Juruá. João Pessoa
<i>callogenys</i>	MZUSP23568	F	Brazil	Amazonas	R. Amazonas (Norte). Lago do Canaçari
<i>callogenys</i>	MZUSP64050	F	Brazil	Amazonas	Itapiranga
<i>callogenys</i>	MZUSP67621	F	Brazil	Amazonas	R. Tapará. Santa Maria do Arapemã
<i>callogenys</i>	MZUSP67622	NA	Brazil	Amazonas	R. Tapará. Santa Maria do Arapemã
<i>callogenys</i>	MZUSP67623	M	Brazil	Amazonas	R. Tapará. Santa Maria do Arapemã
<i>callogenys</i>	MZUSP67624	M	Brazil	Amazonas	R. Tapará. Santa Maria do Arapemã
<i>callogenys</i>	MZUSP68754	M	Brazil	Amazonas	Itapiranga

<i>callogeny</i>	MZUSP68755	F	Brazil	Amazonas	Itapiranga
<i>leucophthalmus</i>	MZUSP10653	M	Brazil	Pará	Santarém
<i>leucophthalmus</i>	MZUSP20504	F	Brazil	Pará	R. Tapajós (Leste). Piquiatuba
<i>leucophthalmus</i>	MZUSP20506	M	Brazil	Pará	R. Tapajós (Leste). Piquiatuba
<i>leucophthalmus</i>	MZUSP20515	M	Brazil	Pará	R. Tapajós (Leste). Caxiricatuba
<i>leucophthalmus</i>	MZUSP20528	M	Brazil	Pará	R. Tapajós (Leste). Caxiricatuba
<i>leucophthalmus</i>	MZUSP20573	NA	Brazil	Pará	R. Tapajós (Leste). Caxiricatuba
<i>leucophthalmus</i>	MZUSP20574	NA	Brazil	Pará	R. Tapajós (Leste). Caxiricatuba
<i>leucophthalmus</i>	MZUSP20578	M	Brazil	Pará	R. Amazonas (Norte). Igarape Buiçu
<i>leucophthalmus</i>	MZUSP20579	M	Brazil	Pará	R. Tapajós (Leste). Caxiricatuba
<i>leucophthalmus</i>	MZUSP20580	F	Brazil	Pará	R. Tapajós (Leste). Piquiatuba
<i>leucophthalmus</i>	MZUSP20935	F	Brazil	Pará	R. Tapajós (Leste). Caxiricatuba
<i>leucophthalmus</i>	MZUSP21005	F	Brazil	Pará	R. Tapajós (Leste). Piquiatuba
<i>leucophthalmus</i>	MZUSP21458	M	Brazil	Pará	R. Tapajós (Leste). Caxiricatuba
<i>leucophthalmus</i>	MZUSP22299	M	Brazil	Pará	R. Amazonas (Sul). Foz do Rio Curua
<i>leucophthalmus</i>	MZUSP22302	M	Brazil	Pará	R. Amazonas (Norte). Igarape Buiçu
<i>leucophthalmus</i>	MZUSP22304	M	Brazil	Pará	R. Tapajós (Leste). Piquiatuba
<i>leucophthalmus</i>	MZUSP22306	M	Brazil	Pará	R. Amazonas (Sul). Foz do Rio Curua
<i>leucophthalmus</i>	MZUSP22317	M	Brazil	Pará	R. Tapajós (Leste). Piquiatuba
<i>leucophthalmus</i>	MZUSP22445	M	Brazil	Pará	R. Tapajós (Leste). Caxiricatuba
<i>leucophthalmus</i>	MZUSP22575	M	Brazil	Pará	R. Tapajós (Leste). Piquiatuba
<i>leucophthalmus</i>	MZUSP22576	M	Brazil	Pará	R. Amazonas (Sul). Foz do Rio Curua
<i>leucophthalmus</i>	MZUSP23565	M	Brazil	Pará	R. Tapajós (Leste). Piquiatuba
<i>leucophthalmus</i>	MZUSP23567	M	Brazil	Pará	R. Amazonas (Norte). Igarape Buiçu
<i>leucophthalmus</i>	MZUSP46397	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>leucophthalmus</i>	MZUSP46398	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>leucophthalmus</i>	MZUSP46399	M	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>leucophthalmus</i>	MZUSP46400	M	Brazil	Pará	R. Tapajós (Leste). Tavio
<i>leucophthalmus</i>	MZUSP46401	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia. Távio
<i>leucophthalmus</i>	MZUSP46402	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia. Távio
<i>leucophthalmus</i>	MZUSP46403	M	Brazil	Pará	R. Tapajós (Leste). Fordlândia. Távio
<i>leucophthalmus</i>	MZUSP46404	M	Brazil	Pará	Fordlândia. Rio Tapajós
<i>leucophthalmus</i>	MZUSP46405	F	Brazil	Pará	Fordlândia. Rio Tapajós
<i>leucophthalmus</i>	MZUSP46406	F	Brazil	Pará	Fordlândia. Rio Tapajós
<i>leucophthalmus</i>	MZUSP46407	M	Brazil	Pará	Fordlândia. Rio Tapajós
<i>leucophthalmus</i>	MZUSP58228	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>leucophthalmus</i>	MZUSP58229	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>leucophthalmus</i>	MZUSP58230	M	Brazil	Pará	R. Tapajós (Leste). Tauari
<i>leucophthalmus</i>	MZUSP58231	M	Brazil	Pará	R. Tapajós (Leste). Tauari
<i>leucophthalmus</i>	MZUSP58232	F	Brazil	Pará	R. Tapajós (Leste). Tauari
<i>leucophthalmus</i>	MZUSP58357	M	Brazil	Pará	R. Tapajós (Leste). Tauari
<i>leucophthalmus</i>	MZUSP58358	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>leucophthalmus</i>	MZUSP58359	M	Brazil	Pará	R. Tapajós (Leste). Tauari
<i>leucophthalmus</i>	MZUSP58360	M	Brazil	Pará	R. Tapajós (Leste). Tauari
<i>leucophthalmus</i>	MZUSP58361	M	Brazil	Pará	R. Tapajós (Leste). Tauari
<i>leucophthalmus</i>	MZUSP58362	M	Brazil	Pará	R. Tapajós (Leste). Tauari
<i>leucophthalmus</i>	MZUSP58363	F	Brazil	Pará	R. Tapajós (Leste). Tauari
<i>leucophthalmus</i>	MZUSP58364	F	Brazil	Pará	R. Tapajós (Leste). Tauari
<i>leucophthalmus</i>	MZUSP58365	M	Brazil	Pará	R. Tapajós (Leste). Fordlândia

<i>leucophthalmus</i>	MZUSP58366	NA	Brazil	Pará	R. Tapajós (Oeste). Urucurituba
<i>leucophthalmus</i>	MZUSP58375	F	Brazil	Pará	R. Tapajós (Leste). Tauari
<i>leucophthalmus</i>	MZUSP60479	M	Brazil	Pará	Uraçagui (Rio Tapajós. oeste)
<i>leucophthalmus</i>	MZUSP60480	M	Brazil	Pará	R. Tapajós (Oeste). Uraçagui
<i>leucophthalmus</i>	MZUSP60481	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>leucophthalmus</i>	MZUSP60482	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>leucophthalmus</i>	MZUSP60494	F	Brazil	Pará	Uraçagui (Rio Tapajós. oeste)
<i>leucophthalmus</i>	MZUSP60495	M	Brazil	Pará	Uraçagui (Rio Tapajós. oeste)
<i>leucophthalmus</i>	MZUSP60496	F	Brazil	Pará	Uraçagui (Rio Tapajós. oeste)
<i>leucophthalmus</i>	MZUSP60497	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>leucophthalmus</i>	MZUSP60498	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>leucophthalmus</i>	MZUSP60499	M	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>leucophthalmus</i>	MZUSP63028	M	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>leucophthalmus</i>	MZUSP63029	F	Brazil	Pará	R. Tapajós (Oeste). Urucurituba
<i>leucophthalmus</i>	MZUSP63030	F	Brazil	Pará	R. Tapajós (Oeste). Urucurituba
<i>leucophthalmus</i>	MZUSP63031	M	Brazil	Pará	R. Tapajós (Oeste). Urucurituba
<i>leucophthalmus</i>	MZUSP63959	M	Brazil	Pará	R. Trombetas. Oriximiná
<i>leucophthalmus</i>	MZUSP63960	F	Brazil	Pará	R. Trombetas. Oriximiná
<i>leucophthalmus</i>	MZUSP64308	F	Brazil	Pará	Baixo Xingu (margem direita)
<i>leucophthalmus</i>	MZUSP66528	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>leucophthalmus</i>	MZUSP66529	M	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>leucophthalmus</i>	MZUSP66530	NA	Brazil	Pará	R. Tapajós (Oeste). Urucurituba
<i>leucophthalmus</i>	MZUSP68875	F	Brazil	Pará	R. Tapajós (Oeste). Urucurituba
<i>leucophthalmus</i>	MZUSP68876	F	Brazil	Pará	R. Tapajós (Oeste). Urucurituba
<i>leucophthalmus</i>	MZUSP68877	M	Brazil	Pará	R. Tapajós (Oeste). Urucurituba
<i>leucophthalmus</i>	MZUSP68878	M	Brazil	Pará	R. Tapajós (Oeste). Urucurituba
<i>leucophthalmus</i>	MZUSP68879	M	Brazil	Pará	R. Tapajós (Oeste). Urucurituba
<i>leucophthalmus</i>	MZUSP68880	M	Brazil	Pará	R. Tapajós (Oeste). Urucurituba
<i>leucophthalmus</i>	MZUSP68881	F	Brazil	Pará	R. Tapajós (Oeste). Urucurituba
<i>leucophthalmus</i>	MZUSP68882	M	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>leucophthalmus</i>	MZUSP68883	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>leucophthalmus</i>	MZUSP68884	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>leucophthalmus</i>	MZUSP68885	M	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>leucophthalmus</i>	MZUSP68886	M	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>leucophthalmus</i>	MZUSP68887	M	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>leucophthalmus</i>	MZUSP68888	NA	Brazil	Pará	R. Tapajós
<i>leucophthalmus</i>	MZUSP71283	M	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>leucophthalmus</i>	MZUSP71284	NA	Brazil	Pará	NA
<i>leucophthalmus</i>	MZUSP71379	M	Brazil	Pará	R. Tapajós (Oeste). Sumaúma
<i>leucophthalmus</i>	MZUSP72098	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>leucophthalmus</i>	MZUSP72099	M	Brazil	Pará	R. Tapajós (Oeste). Sumaúma
<i>leucophthalmus</i>	MZUSP73204	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia. Távio
<i>leucophthalmus</i>	MZUSP73205	M	Brazil	Pará	Fordlândia
<i>leucophthalmus</i>	MZUSP83754	F	Brazil	Pará	Faz. Fartura. Santana do Araguaia
<i>leucophthalmus</i>	MZUSP83755	M	Brazil	Pará	Faz. Fartura. Santana do Araguaia
<i>leucophthalmus</i>	MZUSP83756	NA	Brazil	Pará	Faz. Fartura. Santana do Araguaia
<i>leucophthalmus</i>	MZUSP52306	M	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52307	M	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52308	F	Brazil	Tocantins	Araguatins

<i>leucophthalmus</i>	MZUSP52309	F	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52310	F	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52311	F	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52312	M	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52313	M	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52314	F	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52315	F	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52316	F	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52317	F	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52318	F	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52319	M	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52320	M	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52321	M	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52322	M	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52323	M	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52324	M	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52325	F	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52326	M	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52327	F	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52328	F	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52329	F	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52330	M	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52331	F	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52332	M	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52333	F	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52334	F	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52335	F	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52336	NA	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52337	M	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52338	F	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52339	F	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52340	M	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52341	M	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52342	F	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52343	M	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52344	M	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52345	M	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52346	F	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52347	F	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP52348	NA	Brazil	Tocantins	Araguatins
<i>leucophthalmus</i>	MZUSP14886	M	Brazil	Goiás	Inhumas
<i>leucophthalmus</i>	MZUSP14887	M	Brazil	Goiás	Inhumas
<i>leucophthalmus</i>	MZUSP14888	F	Brazil	Goiás	Jaraguá. Rio das Almas
<i>leucophthalmus</i>	MZUSP14889	M	Brazil	Goiás	Inhumas
<i>leucophthalmus</i>	MZUSP14892	F	Brazil	Goiás	Inhumas
<i>leucophthalmus</i>	MZUSP51814	F	Brazil	Goiás	Goiânia
<i>leucophthalmus</i>	MZUSP52305	NA	Brazil	Goiás	Goiânia
<i>leucophthalmus</i>	MZUSP74027	M	Brazil	Goiás	R. Bagagem (margem esquerda). Serra Negra. Niquelândia

<i>callogenys</i>	MZUSP17094	F	Brazil	Mato Grosso	Chapada
<i>callogenys</i>	MZUSP81756	F	Brazil	Mato Grosso	Linha I. margem esquerda rio Teles Pires. Paranaíta
<i>leucophthalmus</i>	MZUSP20334	M	Brazil	Mato Grosso do Sul	Barra do Paredão. Rio Paraná
<i>leucophthalmus</i>	MZUSP26724	F	Brazil	Mato Grosso do Sul	Salobra
<i>leucophthalmus</i>	MZUSP30143	F	Brazil	Mato Grosso do Sul	Corumbá
<i>leucophthalmus</i>	MZUSP73685	M	Brazil	Mato Grosso do Sul	Faz. Barma. Santa Rita do Pardo
<i>leucophthalmus</i>	MZUSP73686	F	Brazil	Mato Grosso do Sul	Faz. Barma. Santa Rita do Pardo
<i>leucophthalmus</i>	MZUSP7797	M	Brazil	Minas Gerais	Teófilo Otoni
<i>leucophthalmus</i>	MZUSP10357	F	Brazil	Minas Gerais	Araguari. rio Matipo
<i>leucophthalmus</i>	MZUSP10358	F	Brazil	Minas Gerais	Araguari. Q. Sacramento
<i>leucophthalmus</i>	MZUSP82873	F	Brazil	Minas Gerais	Coração de Jesus
<i>leucophthalmus</i>	MZUSP82849	NA	Brazil	Minas Gerais	Coração de Jesus
<i>leucophthalmus</i>	MZUSP88329	NA	Brazil	Minas Gerais	Fazenda Jacaré. Oliveira
<i>leucophthalmus</i>	MZUSP88330	F	Brazil	Minas Gerais	Fazenda Jacaré. Oliveira
<i>leucophthalmus</i>	MZUSP88345	NA	Brazil	Minas Gerais	Fazenda Ribeira das cachoeiras
<i>leucophthalmus</i>	MZUSP1823	F	Brazil	Paraná	Jacarezinho
<i>leucophthalmus</i>	MZUSP36741	M	Brazil	Paraná	R. Paracáí
<i>leucophthalmus</i>	MZUSP36742	M	Brazil	Paraná	R. Paracáí
<i>leucophthalmus</i>	MZUSP36743	M	Brazil	Paraná	R. Paracáí
<i>leucophthalmus</i>	MZUSP36744	M	Brazil	Paraná	R. Paracáí
<i>leucophthalmus</i>	MZUSP36745	M	Brazil	Paraná	R. Paracáí
<i>leucophthalmus</i>	MZUSP3164	NA	Brazil	São Paulo	Franca
<i>leucophthalmus</i>	MZUSP4488	M	Brazil	São Paulo	Avanhandava
<i>leucophthalmus</i>	MZUSP7984	M	Brazil	São Paulo	Franca
<i>leucophthalmus</i>	MZUSP8141	F	Brazil	São Paulo	Ituverava
<i>leucophthalmus</i>	MZUSP9852	M	Brazil	São Paulo	Vila Olímpia
<i>leucophthalmus</i>	MZUSP9853	F	Brazil	São Paulo	Vila Olímpia
<i>leucophthalmus</i>	MZUSP26721	M	Brazil	São Paulo	Faz. Varjão. Lins
<i>leucophthalmus</i>	MZUSP26722	F	Brazil	São Paulo	Faz. Varjão. Lins
<i>leucophthalmus</i>	MZUSP26723	F	Brazil	São Paulo	Faz. Varjão. Lins
<i>leucophthalmus</i>	MZUSP31468	F	Brazil	São Paulo	Faz. Três Barras. Pitangueiras
<i>leucophthalmus</i>	MZUSP74670	NA	Brazil	São Paulo	Castilho. marg esq rio Paraná
<i>leucophthalmus</i>	MZUSP2453	NA	Brazil	Rio Grande do Sul	NA
<i>leucophthalmus</i>	MZUSP9098	M	Brazil	Rio Grande do Sul	R. Uruguai
<i>leucophthalmus</i>	MZUSP9099	F	Brazil	Rio Grande do Sul	R. Uruguai
<i>callogenys</i>	MZUSP72858	NA	Brazil	NA	NA
<i>callogenys</i>	MZUSP72930	NA	Brazil	NA	NA
<i>callogenys</i>	MZUSP73114	F	Brazil	NA	Amazônia
<i>callogenys</i>	MZUSP73121	M	Brazil	NA	Amazônia
<i>callogenys</i>	MZUSP73159	F	Brazil	NA	Amazônia
<i>callogenys</i>	MZUSP68198	M	Peru	NA	Pucallpa
<i>leucophthalmus</i>	LSUMZ782	M	Venezuela	Aragua	San Juan de los morros

<i>callogenys</i>	LSUMZ52913	NA	Ecuador	Napo	Rio Aguarico. Santa Cecilia. ca 400 m
<i>callogenys</i>	LSUMZ52912	F	Ecuador	Napo	Rio Aguarico. Santa Cecilia. ca 400 m
<i>callogenys</i>	LSUMZ87252	F	Peru	Amazonas	12 trail km E La Peca. ca 5700 ft
<i>callogenys</i>	LSUMZ87254	F	Peru	Amazonas	vicinity of Huampami on Rio Conepa. ca 700
<i>callogenys</i>	LSUMZ91666	M	Peru	Amazonas	Caterpiza on quebrada da Caterpiza. E banktrib. Of Rio Santiago. 200 m
<i>leucophthalmus</i>	LSUMZ123507	F	Bolivia	Beni	General Bolivian. 16 km by road SW San Borja. 450 m
<i>leucophthalmus</i>	LSUMZ123508	M	Bolivia	Beni	Moxos. 38 km by road W Trinidad. 175 m
<i>leucophthalmus</i>	LSUMZ37254	M	Bolivia	Beni	Marban. Rio Mamoré. 240 m
<i>leucophthalmus</i>	LSUMZ123509	F	Bolivia	Santa Cruz	Cordillera. 10 km by road E Gutierrez. Laguna Caucaya. 874 m
<i>euops</i>	AMNH54308	F	Cuba	NA	Trinidad
<i>euops</i>	AMNH86886	M	Cuba	NA	San Juan de los Remedios
<i>euops</i>	AMNH54304	M	Cuba	NA	Trinidad
<i>euops</i>	AMNH54310	M	Cuba	NA	Trinidad
<i>euops</i>	AMNH399400bis	F	Cuba	NA	Bayate
<i>euops</i>	AMNH399399	F	Cuba	NA	Bayate
<i>euops</i>	AMNH791581	F	Cuba	NA	Guama
<i>euops</i>	AMNH54312	F	Cuba	NA	Trinidad
<i>euops</i>	AMNH474422	F	NA	NA	NA
<i>euops</i>	AMNH474421	M	NA	NA	London
<i>euops</i>	USNM453658	F	Cuba	Guantanamo	Yateras
<i>euops</i>	USNM372216	NA	captivity	NA	NA
<i>euops</i>	USNM543661	F	Cuba	Guantanamo	Yateras
<i>euops</i>	USNM453679	F	Cuba	Guantanamo	Yateras
<i>euops</i>	USNM453677	F	Cuba	Guantanamo	Yateras
<i>euops</i>	USNM453668	F	Cuba	Guantanamo	Yateras
<i>euops</i>	USNM177452	M	Cuba	NA	Guamá
<i>euops</i>	USNM177490	M	Cuba	NA	Guamá
<i>euops</i>	USNM453676	M	Cuba	Guantanamo	Yateras
<i>euops</i>	USNM103970	F	Cuba	NA	Remedios
<i>euops</i>	LSUMZ52851	M	Cuba	Oriente	Taco Bay
<i>euops</i>	LSUMZ142057	M	Cuba	Camaguey	20 km W of Camaguey
<i>euops</i>	LSUMZ142058	NA	Cuba	Camaguey	20 km W of Camaguey
<i>euops</i>	LSUMZ142059	M	Cuba	Camaguey	20 km W of Camaguey
<i>euops</i>	FMNH371832	M	Cuba	Baracoa	El Jucaro. Veguitas del Sur
<i>euops</i>	FMNH371833	M	Cuba	Baracoa	La Tinta. orilla del rio Cañas. Jauco
<i>euops</i>	FMNH40315	NA	Cuba	NA	NA
<i>euops</i>	FMNH40318	M	Cuba	Oriente	Yaleras
<i>euops</i>	FMNH40317	F	Cuba	Oriente	Yaleras
<i>euops</i>	FMNH40316	M	Cuba	Oriente	Yaleras
<i>euops</i>	FMNH371829	M	Cuba	Oriente	Jobabo
<i>euops</i>	FMNH371831	M	Cuba	Baracoa	El Jucaro. Veguitas del Sur
<i>euops</i>	FMNH371830	F	Cuba	Baracoa	El Jucaro. Veguitas del Sur
<i>euops</i>	BMNH1914.18.1.407	NA	Cuba	NA	Mayari River. Nipe Bay
<i>euops</i>	BMNH1914.12.1.406	NA	Cuba	NA	Mayari River. Nipe Bay
<i>euops</i>	MNHN141	M	Cuba	NA	Bayate

<i>finschi</i>	BMNH1889.1.30.68	M	Panama	Veragua	W of David. S slope of volcano of Chiriqui. Bugaba
<i>finschi</i>	AMNH389258	M	Costa Rica	NA	Limon
<i>finschi</i>	AMNH186673	F	Panama	NA	a Marea. 20 miles S of Santiago. Veraguas
<i>finschi</i>	AMNH474360	F	Panama	Chiriqui	Brava I.
<i>finschi</i>	AMNH474359	M	Panama	Chiriqui	Brava I.
<i>finschi</i>	AMNH389263	M	Costa Rica	NA	Val.Turrialba. 500 ft. Ital. La Iberia
<i>finschi</i>	AMNH389259	M	Costa Rica	NA	Limon
<i>finschi</i>	AMNH186678	F	Panama	NA	El Villano. 15 miles SE of Santiago. Veraguas
<i>finschi</i>	AMNH186680	M	Panama	NA	El Villano. 15 miles SE of Santiago. Veraguas
<i>finschi</i>	AMNH474361	M	Panama	NA	Cebaco I.Veragua
<i>finschi</i>	AMNH474357	M	Panama	NA	Ladrones I.
<i>finschi</i>	USNM199169	F	Costa Rica	NA	Bonillo
<i>finschi</i>	USNM209810	F	Costa Rica	NA	Bonillo
<i>finschi</i>	USNM127043	F	Nicaragua	NA	Rio Escondido
<i>finschi</i>	USNM199162	F	Costa Rica	NA	Bonillo
<i>finschi</i>	USNM532993	F	Panama	Chiriqui	Puerto Armuelles
<i>finschi</i>	USNM209821	F	Costa Rica	NA	Guayabo
<i>finschi</i>	USNM209822	F	Costa Rica	NA	Guayabo
<i>finschi</i>	USNM209824	F	Costa Rica	NA	Guayabo
<i>finschi</i>	USNM209813	F	Costa Rica	NA	Bonillo
<i>finschi</i>	USNM209823	F	Costa Rica	NA	Guayabo
<i>finschi</i>	LSUMZ32439	M	Costa Rica	Limon	1 mi S Linda Vista. 480 m
<i>finschi</i>	LSUMZ35369	F	Costa Rica	Limon	Guacimo. Rio Guacimo
<i>finschi</i>	LSUMZ35370	M	Costa Rica	Heredia	ca 2 mi SE Puerto Viejo
<i>finschi</i>	LSUMZ98211	M	Costa Rica	Alajuela	ca 1 mi NE Los Chiles
<i>finschi</i>	LSUMZ174813	M	Panama	Chiriqui	Bartolo Arriba. Burica Peninsula
<i>finschi</i>	FMNH206802	F	Panama	Boquete	Lerida. 5300 ft
<i>finschi</i>	FMNH206801	M	Panama	Boquete	Lerida. 5300 ft
<i>finschi</i>	FMNH206803	M	Panama	Boquete	Quiel. 5000 ft
<i>finschi</i>	FMNH206804	F	Panama	Boquete	Quiel. 5000 ft
<i>finschi</i>	FMNH206800	NA	Panama	Boquete	Lerida. 5300 ft
<i>finschi</i>	FMNH72322	M	Costa Rica	Limon	Guapiles
<i>finschi</i>	FMNH72320	M	Costa Rica	Limon	Limon
<i>finschi</i>	FMNH72321	F	Costa Rica	Limon	Guapiles
<i>finschi</i>	FMNH44127	M	Costa Rica	Limon	Limon
<i>finschi</i>	FMNH36020	M	Costa Rica	Cartago	Guayabo
<i>finschi</i>	MNHN514	NA	Panama	Chiriqui	NA
<i>chloropterus</i>	BMNH1859.11.22.56	NA	Dominican Republic	NA	San Domingo
<i>chloropterus</i>	AMNH163835	M	Dominican Republic	NA	San Domingo
<i>chloropterus</i>	AMNH163829	M	Dominican Republic	NA	San Domingo
<i>chloropterus</i>	AMNH474416	M	Dominican Republic	NA	Crucero. San Domingo
<i>chloropterus</i>	AMNH474412	M	Dominican Republic	NA	San Domingo. Azua

<i>chloropterus</i>	AMNH163828	M	Dominican Republic	NA	San Domingo
<i>chloropterus</i>	AMNH163831	M	Dominican Republic	NA	San Domingo
<i>chloropterus</i>	AMNH269849	F	Dominican Republic	NA	San Domingo. San Juan
<i>chloropterus</i>	AMNH474411	M	Dominican Republic	NA	San Domingo. Azua
<i>chloropterus</i>	AMNH163827	M	Dominican Republic	NA	San Domingo
<i>chloropterus</i>	AMNH474413	M	Dominican Republic	NA	San Domingo. Azua
<i>chloropterus</i>	USNM92047	F	Dominican Republic	NA	Samana
<i>chloropterus</i>	USNM354354	M	Dominican Republic	NA	San Juan
<i>chloropterus</i>	USNM264742	F	Haiti	NA	Massif de la Selle
<i>chloropterus</i>	USNM280158	F	Haiti	NA	San Rafael
<i>chloropterus</i>	USNM280161	F	Haiti	NA	Cerea La Source
<i>chloropterus</i>	USNM109927	M	Dominican Republic	NA	Samana
<i>chloropterus</i>	USNM354356	F	Dominican Republic	NA	San Juan
<i>chloropterus</i>	USNM264740	M	Dominican Republic	NA	Costanza
<i>chloropterus</i>	USNM354357	F	Dominican Republic	NA	San Juan
<i>chloropterus</i>	USNM324871	M	NA	NA	NA
<i>chloropterus</i>	LSUMZ142050	M	Dominican Republic	El Seibo	16 mi E Miches
<i>chloropterus</i>	LSUMZ142051	F	Dominican Republic	El Seibo	16 mi E Miches
<i>chloropterus</i>	LSUMZ142052	M	Dominican Republic	El Seibo	16 mi E Miches
<i>chloropterus</i>	LSUMZ142053	F	Dominican Republic	San Juan	4 km E El Cercado
<i>chloropterus</i>	LSUMZ142054	M	Dominican Republic	Monte Cristi	Laguna, 7 km SE Pepillo Salcedo
<i>chloropterus</i>	LSUMZ142056	M	Haiti	L'Ouest	1.1 mi S Poste Rouge
<i>chloropterus</i>	FMNH40302	M	Dominican Republic	Samana	Samana
<i>chloropterus</i>	FMNH40285	M	Dominican Republic	Samana	Samana
<i>chloropterus</i>	FMNH40305	M	Dominican Republic	Samana	Samana
<i>chloropterus</i>	FMNH40297	M	Dominican Republic	Samana	Samana
<i>chloropterus</i>	FMNH40288	F	Dominican Republic	Samana	Samana
<i>chloropterus</i>	FMNH1833	F	Dominican Republic	Santo Domingo	Catare
<i>chloropterus</i>	FMNH40312	F	Dominican Republic	Seibo	Magua
<i>chloropterus</i>	FMNH40313	F	Dominican Republic	Seibo	Magua
<i>chloropterus</i>	FMNH40293	F	Dominican	Samana	Samana

			Republic		
<i>chloropterus</i>	FMNH355157	F	Dominican Republic	Cabo Rojo	NA
<i>chloropterus</i>	MNHN475	M	Dominican Republic	NA	San Domingo
<i>chloropterus</i>	MNHN477	M	Dominican Republic	NA	San Domingo
<i>chloropterus</i>	MNHN476	M	Dominican Republic	NA	San Domingo
<i>maugei</i>	MNHN132	NA	Antilles	NA	NA
<i>maugei</i>	LSUMZ39657	M	Puerto Rico	NA	Mona Island
<i>maugei</i>	LSUMZ43732	F	Puerto Rico	NA	Mona Island
<i>maugei</i>	LSUMZ61276	F	Puerto Rico	NA	Mona Island
<i>maugei</i>	FMNH40314	F	Puerto Rico	NA	Mona Island
<i>erythrogegens</i>	BMNH18.59.11.22.5	NA	Ecuador	NA	Guaiaquil
<i>erythrogegens</i>	AMNH44692	F	Ecuador	NA	Guaiaquil
<i>erythrogegens</i>	AMNH474354	NA	Peru	NA	Tumbes
<i>erythrogegens</i>	AMNH474352	NA	Ecuador	NA	Zoological Society's Gradens. Regent's Park. London
<i>erythrogegens</i>	AMNH166731	F	Ecuador	NA	Punta Santa Ana. Portovelo-Loja trail. Prov. Del Oro
<i>erythrogegens</i>	AMNH474353	NA	Peru	NA	Gran N Peron
<i>erythrogegens</i>	AMNH170922	F	Ecuador	NA	Bucay. Prov. De Chimborazo
<i>erythrogegens</i>	AMNH170920	F	Ecuador	NA	Guainiche. SE of Alamor. Prov. De Loja
<i>erythrogegens</i>	AMNH474351	F	Ecuador	NA	Zoological Society's Gradens. Regent's Park. London
<i>erythrogegens</i>	AMNH123999	F	Ecuador	NA	Daule. Prov. Of Guayas
<i>erythrogegens</i>	AMNH175100	M	Peru	NA	Dpto. Piura. Palamblla. 3900-6500 ft
<i>erythrogegens</i>	USNM609361	F	Peru	NA	NA
<i>erythrogegens</i>	USNM20948	NA	Brasil	Paraná	NA
<i>erythrogegens</i>	LSUMZ75110	F	Peru	Tumbes	Rica Playa. rio Tumbes
<i>erythrogegens</i>	LSUMZ75109	F	Peru	Tumbes	Rica Playa. rio Tumbes
<i>erythrogegens</i>	LSUMZ182914	M	Peru	Tumbes	7.4 km S El Tutuno
<i>erythrogegens</i>	LSUMZ182915	M	Peru	Tumbes	1.2 km NE El Cardo
<i>erythrogegens</i>	LSUMZ80368	F	Peru	Piura	ca 3 km by road N Chignia. ca 1000
<i>erythrogegens</i>	LSUMZ72172	M	Peru	Piura	ca 90 km NNW Sullana El Angolo. ca 700m
<i>erythrogegens</i>	LSUMZ84334	F	Peru	Lambayequei	12 km N Olmos
<i>erythrogegens</i>	LSUMZ100614	F	Peru	Lambayequei	Las Pampas. km 885 Pan-american Hwy. 11 km N Olmos. 90 m
<i>erythrogegens</i>	FMNH57493	M	Ecuador	Guayas	Puente de Chimbo
<i>erythrogegens</i>	FMNH57624	F	Ecuador	Guayas	Milagro
<i>erythrogegens</i>	FMNH53671	M	Ecuador	Azuay	San Jose
<i>erythrogegens</i>	FMNH56723	M	Ecuador	Guayas	Milagro
<i>erythrogegens</i>	FMNH57622	F	Ecuador	Guayas	Milagro
<i>erythrogegens</i>	FMNH57428	F	Ecuador	Guayas	Puente de Chimbo
<i>erythrogegens</i>	FMNH371825	M	captivity	Miami	NA
<i>erythrogegens</i>	MNHN481	NA	NA	NA	Pahatanga
<i>erythrogegens</i>	MNHN480	NA	Ecuador	NA	NA
<i>erythrogegens</i>	MNHN482	NA	Ecuador	NA	NA
<i>strenuus</i>	USNM91098	M	Nicaragua	NA	NA

<i>strenuus</i>	AMNH143783	F	Nicaragua	NA	Corinto
<i>strenuus</i>	AMNH406625	F	Guatemala	NA	Finca Cipres
<i>strenuus</i>	AMNH406624	F	Guatemala	NA	Sacapulas
<i>strenuus</i>	AMNH393722	M	Guatemala	NA	San Lucas
<i>strenuus</i>	AMNH343721	M	Guatemala	NA	San Lucas
<i>strenuus</i>	AMNH406623	F	Guatemala	NA	Sacapulas
<i>strenuus</i>	AMNH393718	M	Guatemala	NA	Finca Cipres
<i>strenuus</i>	AMNH393720	F	Guatemala	NA	Finca Cipres
<i>strenuus</i>	AMNH143785	M	Nicaragua	NA	Corinto
<i>strenuus</i>	AMNH393717	NA	Guatemala	NA	Chichicastenango
<i>strenuus</i>	USNM257757	M	Guatemala	NA	NA
<i>strenuus</i>	USNM191648	NA	Guatemala	NA	NA
<i>strenuus</i>	USNM349535	M	Guatemala	NA	Tecpam
<i>strenuus</i>	USNM349536	F	Guatemala	NA	Chichivac
<i>strenuus</i>	USNM257758	M	Guatemala	NA	NA
<i>strenuus</i>	LSUMZ39656	M	Mexico	Oaxaca	La Ventosa
<i>strenuus</i>	LSUMZ23691	M	Guatemala	Usumatlan 2 mi N	Sierra de las Minas
<i>strenuus</i>	FMNH50108	NA	Guatemala	NA	NA
<i>strenuus</i>	FMNH111278	M	El Salvador	San Salvador	Volcan de San Rafael
<i>strenuus</i>	FMNH111277	F	El Salvador	San Salvador	Volcan de San Rafael
<i>strenuus</i>	FMNH111279	F	El Salvador	NA	Sonsonate
<i>strenuus</i>	FMNH212209	M	El Salvador	San Salvador	NA
<i>strenuus</i>	FMNH212208	F	El Salvador	San Salvador	NA
<i>rubritorquis</i>	FMNH15509	F	Nicaragua	Chinandeza	San Geronimo
<i>rubritorquis</i>	FMNH15507	F	Nicaragua	Chinandeza	San Geronimo
<i>rubritorquis</i>	FMNH15506	F	Nicaragua	Chinandeza	San Geronimo
<i>rubritorquis</i>	FMNH15511	F	Nicaragua	Chinandeza	San Geronimo
<i>brewsteri</i>	MCZ24700	M	Mexico	Chihuahua	Hacienda de San Rafael
<i>brewsteri</i>	USNM300182	M	Mexico	Chihuahua	Hacienda de San Rafael
<i>brevipes</i>	USNM39971	M	Mexico	NA	Socorro Island
<i>brevipes</i>	AMNH474433	F	Mexico	NA	Socorro Island
<i>brevipes</i>	AMNH474428	M	Mexico	NA	Socorro Island
<i>brevipes</i>	AMNH474427	M	Mexico	NA	Socorro Island
<i>brevipes</i>	AMNH474429	M	Mexico	NA	Socorro Island
<i>brevipes</i>	AMNH474430	M	Mexico	NA	Socorro Island
<i>brevipes</i>	AMNH474432	F	Mexico	NA	Socorro Island
<i>brevipes</i>	AMNH474431	M	Mexico	NA	Socorro Island
<i>brevipes</i>	USNM189123	M	Mexico	NA	Socorro Island
<i>brevipes</i>	USNM39972	F	Mexico	NA	Socorro Island
<i>brevipes</i>	USNM189121	M	Mexico	NA	Socorro Island
<i>brevipes</i>	USNM309059	F	Mexico	NA	Socorro Island
<i>brevipes</i>	USNM309060	M	Mexico	NA	Socorro island
<i>brevipes</i>	USNM189122	F	Mexico	NA	Socorro Island
<i>brevipes</i>	USNM189124	F	Mexico	NA	Socorro Island
<i>brevipes</i>	USNM189125	M	Mexico	NA	Socorro Island
<i>brevipes</i>	USNM507774	M	Mexico	NA	Socorro Island
<i>brevipes</i>	USNM50776	F	Mexico	NA	Socorro Island
<i>holochlorus</i>	BMNH1890.6.1.35	NA	Mexico	Vera Cruz	Jalapa

<i>holochlorus</i>	FMNH208673	M	Mexico	Taumalipas	Rio Sabinas near Gomez Farias. Pano Ayuctle 30 mi N El Mante
<i>holochlorus</i>	FMNH102801	F	Mexico	Taumalipas	Rio Sabinas near Gomez Farias
<i>holochlorus</i>	FMNH102802	M	Mexico	Taumalipas	Rio Sabinas near Gomez Farias
<i>holochlorus</i>	FMNH111800	NA	Mexico	Taumalipas	Santa Egracia
<i>holochlorus</i>	FMNH189793	F	Mexico	Chiapas	Acacoyagua. Escuintla
<i>holochlorus</i>	FMNH208671	M	Mexico	Chiapas	40 min NW of Arriaga. Hacienda Monserrate
<i>holochlorus</i>	FMNH208672	F	Mexico	Chiapas	40 min NW of Arriaga. Hacienda Monserrate
<i>holochlorus</i>	FMNH208674	F	Mexico	Chiapas	NW of Arriaga. Hacienda Monserrate
<i>holochlorus</i>	FMNH122790	M	Mexico	Taumalipas	60 mi S Victoria at Alicia
<i>holochlorus</i>	FMNH355155	NA	captivity	Florida	Busch Gardens
<i>holochlorus</i>	AMNH81008	F	Mexico	NA	Montemorelos
<i>holochlorus</i>	AMNH81000	F	Mexico	Taumalipas	Rio Pilon
<i>holochlorus</i>	AMNH706221	F	Mexico	San Luis Potosi	Ebano
<i>holochlorus</i>	AMNH388713	M	Mexico	Taumalipas	Rio Sabinas
<i>holochlorus</i>	AMNH775907	M	Mexico	Oaxaca. Chiapas Line	10 miles E Tapanatepec
<i>holochlorus</i>	AMNH706220	M	Mexico	San Luis Potosi	Ebano
<i>holochlorus</i>	AMNH393347	M	Mexico	Tamaulipas	Canon Guiaves
<i>holochlorus</i>	AMNH393348	F	Mexico	Tamaulipas	Canon Guiaves
<i>holochlorus</i>	USNM155377	M	Mexico	Vera Cruz	El Mirador
<i>holochlorus</i>	USNM158511	F	Mexico	Tamaulipas	El Forlon
<i>holochlorus</i>	USNM158512	M	Mexico	Tamaulipas	El Forlon
<i>holochlorus</i>	USNM158508	NA	Mexico	Tamaulipas	El Forlon
<i>holochlorus</i>	USNM158509	F	Mexico	Tamaulipas	El Forlon
<i>holochlorus</i>	LSUMZ13319	F	Mexico	Tamaulipas	Giiemes. Rio Corona. 22 mi E of Victoria
<i>holochlorus</i>	LSUMZ5159	M	Mexico	Tamaulipas	Victoria. near Guemes on Rio Corona
<i>holochlorus</i>	LSUMZ13318	F	Mexico	Tamaulipas	Carion de Galeana
<i>holochlorus</i>	LSUMZ43728	M	Mexico	Tamaulipas	5km N Gomez Farias. 300 ft
<i>holochlorus</i>	LSUMZ5160	F	Mexico	Tamaulipas	Victoria. near Giiemes
<i>holochlorus</i>	LSUMZ5157	F	Mexico	Tamaulipas	Victoria. Rio Corona
<i>holochlorus</i>	LSUMZ15017	F	Mexico	San Luis Potosi	Ingenio de San Marco. 1.5 mi E of Rio verde
<i>holochlorus</i>	LSUMZ10955	F	Mexico	San Luis Potosi	Cueva Salpitre. Xilitla
<i>holochlorus</i>	LSUMZ10954	F	Mexico	San Luis Potosi	El Salto
<i>holochlorus</i>	LSUMZ15016	M	Mexico	San Luis Potosi	Micos
<i>holochlorus</i>	LSUMZ16771	M	Mexico	San Luis Potosi	El Nacimiento del Coy
<i>holochlorus</i>	LSUMZ16770	M	Mexico	San Luis Potosi	Puente de Dios. Rio Santa Maria
<i>holochlorus</i>	LSUMZ10953	F	Mexico	San Luis Potosi	El Salto
<i>holochlorus</i>	LSUMZ15019	F	Mexico	San Luis Potosi	6 mi E of Sabinito
<i>holochlorus</i>	LSUMZ19801	F	Mexico	San Luis Potosi	Tonelaco. Catone chico
<i>holochlorus</i>	LSUMZ166805	M	Mexico	Oaxaca	Las Minas. ca mi W Chiapas Oaxaca line
<i>holochlorus</i>	LSUMZ33041	F	Mexico	Oaxaca	1 mi W La Ventosa
<i>holochlorus</i>	LSUMZ15018	M	Mexico	San Luis Potosi	1.5 mi E of Rioverde
<i>holochlorus</i>	LSUMZ39655	M	Mexico	Chiapas	6 mi NE of Tonala. Chiapas
<i>holochlorus</i>	LSUMZ43731	M	Mexico	Chiapas	6 mi NE of Tonala. Chiapas
<i>strenuus</i>	LSUMZ65534	F	Guatemala	Santa Rosa	Cuilapa. 15 mi S

<i>strenuus</i>	LSUMZ65533	F	Guatemala	Suchitepequez	Patulul
<i>strenuus</i>	MNHN508	NA	NA	NA	San Salvador
<i>holochlorus</i>	MNHN510	NA	NA	NA	Jamaica
<i>rubritorquis</i>	BMNH1890.6.1.42	M	captivity	NA	London
<i>rubritorquis</i>	AMNH474425	F	Nicaragua	NA	NA
<i>rubritorquis</i>	AMNH143787	M	Nicaragua	Pine region. 3500 ft	San Rafael del Norte
<i>rubritorquis</i>	AMNH474426	F	Nicaragua	NA	Matagalpa
<i>rubritorquis</i>	AMNH143788	F	Nicaragua	NA	San Rafael del Norte
<i>rubritorquis</i>	AMNH143790	F	Nicaragua	NA	Matagalpa
<i>rubritorquis</i>	AMNH326001	M	Honduras	Tegucigalpa	Archaga. La Flor. 2050 ft
<i>rubritorquis</i>	AMNH325999	F	Honduras	Tegucigalpa	Tegucigalpa
<i>rubritorquis</i>	AMNH102434	F	Nicaragua	NA	Matagalpa
<i>rubritorquis</i>	AMNH326000	M	Honduras	Tegucigalpa	Archaga. La Flor. 2050 ft
<i>rubritorquis</i>	AMNH143791	M	Nicaragua	NA	Matagalpa
<i>rubritorquis</i>	USNM348098	F	Honduras	Comayaga	Cerro Cantoral
<i>rubritorquis</i>	USNM333068	M	captivity	NA	Natural Zoological Park
<i>rubritorquis</i>	USNM132111	F	Guatemala	NA	NA
<i>rubritorquis</i>	FMNH95176	F	Guatemala	Zacapa	El Rancho
<i>rubritorquis</i>	FMNH22419	M	Guatemala	Zacapa	Gualan
<i>rubritorquis</i>	FMNH22418	M	Guatemala	Zacapa	Gualan
<i>rubritorquis</i>	FMNH22417	F	Guatemala	Zacapa	Gualan
<i>rubritorquis</i>	FMNH22420	M	Guatemala	Zacapa	Gualan
<i>rubritorquis</i>	FMNH21864	F	Nicaragua	Jinotega	San Rafael del Norte
<i>rubritorquis</i>	FMNH21865	M	Nicaragua	Jinotega	San Rafael del Norte
<i>mitratus</i>	USNM41926	NA	Argentina	NA	Beron
<i>tucumanus</i>	AMNH474347	M	Argentina	Tucuman	NA
<i>tucumanus</i>	AMNH474342	M	Argentina	Tucuman	Bosques
<i>tucumanus</i>	AMNH474343	F	Argentina	Tucuman	Bosques
<i>tucumanus</i>	AMNH474344	M	Argentina	Tucuman	NA
<i>tucumanus</i>	AMNH474349	F	Argentina	Tucuman	NA
<i>tucumanus</i>	AMNH474346	M	Argentina	Tucuman	NA
<i>tucumanus</i>	MACN7436	M	Argentina	Tucuman	NA
<i>mitratus</i>	MACN4320	M	Argentina	Salta	NA
<i>tucumanus</i>	MACN	NA	Argentina	Tucuman	Concepcion
<i>mitratus</i>	MACN29187	M	Argentina	Ambato	Catamarca. La Rinconada
<i>mitratus</i>	MZUSP3938	M	Argentina	Salta	Rosario
<i>mitratus</i>	MNHN507	NA	Bolivia	NA	NA
<i>mitratus</i>	MNHN506	M	Bolivia	Santa Cruz	Olgin
<i>alticolus</i>	AMNH129136	M	Peru	Cuzco	11.000 ft
<i>alticolus</i>	AMNH129138	F	Peru	NA	Cuzco. 11.000 ft
<i>alticolus</i>	AMNH129137	F	Peru	NA	Cuzco. 11.000 ft
<i>mitratus</i>	FMNH222260	M	Peru	Apurimac	Andahuaylas. Hda.Palmira
<i>hockingi</i>	FMNH59546	F	Peru	Huanuco	Chinchao
<i>mitratus</i>	FMNH222261	M	Peru	Apurimac	Andahuaylas. Hda.Palmira
<i>mitratus</i>	AMNH139084	F	Bolivia	Cochabamba	Mizque. 7.500 ft
<i>mitratus</i>	AMNH166512	M	Peru	NA	NA
<i>mitratus</i>	AMNH139081	M	Bolivia	Cochabamba	Mizque. 7.500 ft
<i>mitratus</i>	AMNH139083	F	Bolivia	Cochabamba	Mizque. 7.500 ft

<i>hockingi</i>	USNM273072	F	Peru	Urubamba	Torontoy
<i>mitratus</i>	USNM273073	F	Peru	Urubamba	Machu Picchu
<i>hockingi</i>	USNM273071	M	Peru	Urubamba	Torontoy
<i>mitratus</i>	USNM169139	M	Peru	Cajamarca	Minabamba
<i>hockingi</i>	LSUMZ73791	F	Peru	Huanuco	Bosque Zapatogocha above Acomayo
<i>hockingi</i>	LSUMZ73786	F	Peru	Huanuco	base of bosque Zapatogocha above Acomayo. ca 8500
<i>hockingi</i>	LSUMZ73788	F	Peru	Huanuco	base of bosque Zapatogocha above Acomayo. ca 8500
<i>hockingi</i>	LSUMZ73789	NA	Peru	Huanuco	base of bosque Zapatogocha above Acomayo. ca 8700
<i>hockingi</i>	LSUMZ73787	M	Peru	Huanuco	base of bosque Zapatogocha above Acomayo. ca 8600
<i>chlorogenys</i>	LSUMZ71366	M	Peru	Juanin	ca 2 km W Pan de Azucar. ca 4400
<i>mitratus</i>	LSUMZ123506	M	Bolivia	Santa Cruz	2.5 km N Tambo. Rio San Isidro Valley. 1525 m
<i>mitratus</i>	LSUMZ37253	F	Bolivia	Santa Cruz	Achiraz. Florida
<i>mitratus</i>	LSUMZ168730	M	Bolivia	Santa Cruz	La Paicha. ca 28 km S Samaipata
<i>mitratus</i>	LSUMZ168734	F	Bolivia	Santa Cruz	Chuchial. ca 37 km of Samaipata. 950 m
<i>mitratus</i>	LSUMZ168733	M	Bolivia	Santa Cruz	Chuchial. ca 37 km of Samaipata. 950 m
<i>tucumanus</i>	FMNH58259	M	Argentina	Tucuman	Concepcion
<i>tucumanus</i>	FMNH58260	F	Argentina	Tucuman	Concepcion
<i>tucumanus</i>	FMNH58261	NA	Argentina	Tucuman	Concepcion
<i>tucumanus</i>	FMNH58262	F	Argentina	Tucuman	Concepcion
<i>tucumanus</i>	FMNH58910	F	Argentina	Tucuman	Las Pavas
<i>chlorogenys</i>	AMNH435434	M	Peru	S of Chachapoyas	San Pedro. 8600-9400 ft
<i>chlorogenys</i>	AMNH474337	M	Peru	Junin region	Chanchamayo
<i>chlorogenys</i>	AMNH234327	M	Peru	N of Chachapoyas	La Lejia. 9000 ft
<i>chlorogenys</i>	AMNH234329	F	Peru	N of Chachapoyas	La Lejia. 9000 ft
<i>chlorogenys</i>	AMNH234328	M	Peru	N of Chachapoyas	La Lejia. 9000 ft
<i>chlorogenys</i>	AMNH235433	M	Peru	S of Chachapoyas	San Pedro. 8600-9400 ft
<i>frontatus/minor</i>	AMNH156318	NA	Ecuador	NA	San Lucas
<i>transilis</i>	AMNH188155	F	Venezuela	NA	Rio Neveri. 2400 ft
<i>minor</i>	AMNH181890	M	Peru	NA	Perico. Rio Chinchipe
<i>minor</i>	AMNH181891	M	Peru	NA	Perico. Rio Chinchipe
<i>transilis</i>	AMNH474367	M	Venezuela	Sucre	Los dos Rios. St. of Cumana
<i>minor</i>	AMNH181892	F	Peru	NA	Perico. Rio Chinchipe
<i>frontatus/minor</i>	AMNH170918	M	Ecuador	Loja	Lunama'. Prov. De loja
<i>minor</i>	AMNH803056	NA	Peru	NA	NA
<i>frontatus</i>	AMNH461751	M	Peru	Lima	Huariconga. Fortaleza Valley
<i>frontatus</i>	AMNH461750	M	Peru	Lima	Huariconga. Pativilca Valley. 1500 ft
<i>transilis</i>	MCZ249706	M	Venezuela	NA	Cuschivano
<i>transilis</i>	USNM88479	M	Venezuela	Puerto Cabello	San Esteban
<i>transilis</i>	USNM351886	M	Venezuela	Aragua	Rancho Grande
<i>transilis</i>	USNM351887	M	Venezuela	Aragua	Rancho Grande

<i>transilis</i>	FMNH188824	M	Venezuela	Aragua	Ocumare de la Costa
<i>transilis</i>	FMNH34529	F	Venezuela	Aragua	Lake Valencia
<i>transilis</i>	FMNH91882	F	Venezuela	Sucre	Mt. Turumiquire
<i>transilis</i>	FMNH91883	M	Venezuela	Sucre	Mt. Turumiquire
<i>transilis</i>	FMNH91881	M	Venezuela	Sucre	Mt. Turumiquire
<i>transilis</i>	FMNH91878	F	Venezuela	Sucre	Mt. Turumiquire
<i>wagleri</i>	BMNH1843.5.24.42	NA	Colombia	Bogota	Sante Fe de Bogotá
<i>wagleri</i>	MZUSP2270	NA	Colombia	Bogota	NA
<i>wagleri</i>	LSUMZ90383	M	Colombia	Magdalena	25 km SE Santa Marta. 7200 ft
<i>wagleri/transilis</i>	MNHN513	NA	Colombia	NA	NA
<i>transilis</i>	MNHN166	NA	Venezuela	NA	Caracas
<i>wagleri</i>	MNHN511	F	Colombia	Magdalena	Minea. Catorra
<i>wagleri</i>	MNHN279	NA	NA	NA	NA
<i>wagleri</i>	AMNH111439	M	Colombia	Tolima	Chicoral. Coello River
<i>wagleri</i>	AMNH474381	NA	Colombia	Bogota	NA
<i>wagleri</i>	AMNH71575	F	Colombia	Antioquia	Rio Zapata
<i>wagleri</i>	AMNH474379	NA	Colombia	Bogota	NA
<i>wagleri</i>	AMNH11438	F	Colombia	Tolima	Chicoral. Coello River
<i>wagleri</i>	AMNH115747	F	Colombia	NA	La Sierra. Cen. Andes. Cauca
<i>wagleri</i>	AMNH474377	NA	Colombia	Bogota	NA
<i>wagleri</i>	AMNH108754	F	Colombia	NA	Palmira 8500 ft. Cauca
<i>wagleri</i>	AMNH73192	F	Colombia	NA	Valparaiso
<i>wagleri</i>	AMNH474374	M	Colombia	NA	Rio Dagua
<i>wagleri</i>	USNM386828	F	Colombia	Rio Guatupuri	Chenducua
<i>wagleri</i>	USNM386827	M	Colombia	Rio Guatupuri	Chenducua
<i>wagleri</i>	USNM386826	M	Colombia	Rio Guatupuri	Chenducua
<i>wagleri</i>	USNM383472	F	Colombia	Sierra Nevada. Santa Marta	Atanquez
<i>wagleri</i>	USNM372591	M	Colombia	Sierra Peija. 5300 ft	La Africa
<i>wagleri</i>	USNM372596	F	Colombia	Magdalena. Sierra Peija	Eroca
<i>wagleri</i>	USNM373594	M	Colombia	Magdalena	Eroca
<i>wagleri</i>	USNM373593	F	Colombia	Magdalena	Eroca
<i>wagleri</i>	USNM372592	F	Colombia	Sierra Peija. 5300 ft	La Africa
<i>wagleri</i>	USNM442905	F	Colombia	Rio Cauca. Paso de lo Jamundi	Valle
<i>wagleri</i>	FMNH91880	F	Venezuela	Sucre	Mt. Turumiquire
<i>wagleri</i>	FMNH13680	NA	Colombia	Bogota	NA
<i>wagleri</i>	FMNH13681	M	Colombia	Bogota	NA
<i>wagleri</i>	FMNH255497	M	Colombia	Cauca	Rio Guachicono
<i>wagleri</i>	FMNH255498	F	Colombia	Cauca	Rio Guachicono
<i>frontatus</i>	ZMB10212	NA	Peru	NA	NA
<i>frontatus</i>	LSUMZ77978	F	Peru	Piura	33 km by road SW Huancabamba below Cruz Blanca
<i>minor</i>	FMNH44119	F	Peru	Cajamarca	Hacienda Limon
<i>minor</i>	FMNH44120	F	Peru	Cajamarca	Hacienda Limon
<i>frontatus</i>	FMNH299861	F	Peru	Lima	Yauyos
<i>frontatus</i>	FMNH299860	M	Peru	Lima	Yauyos

<i>frontatus</i>	FMNH299862	M	Peru	Lima	Yauyos
<i>minor</i>	ANSP108178	NA	Peru	La Libertad	Soquian
<i>minor</i>	LSUMZ91664	M	Peru	La Libertad	Chagual. Rio Marañon. 30 road km E Aricapampa
<i>minor</i>	LSUMZ91665	NA	Peru	La Libertad	Chagual. Rio Marañon. 30 road km E Aricapampa
<i>minor</i>	LSUMZ80367	M	Peru	Cajamarca	ca 5 km by rd W Balsas. ca 3400
<i>minor</i>	LSUMZ75108	M	Peru	Amazonas	Balsas. along Rio Marañon. ca 2700

Appendix 2. List of examined skeletons, where “NA” indicates missing information and “complex” refers to specimens that could not be identified at species level.

Taxon	N°	Sex	observations	Locality/Donor
<i>wagleri</i> complex	BMNHs/2006.51.2	F	captivity	G. Smith
<i>wagleri</i> complex	BMNHs/2013.10.1	F	captivity	G. Smith
<i>wagleri</i> complex	BMNHs/2002.4.5	F	captivity	G. Smith
<i>wagleri</i> complex	BMNHs/2006.56.5	NA	captivity	G. Smith
<i>wagleri</i>	AMNH3387	NA		Venezuela
<i>wagleri</i> complex	AMNH3520	NA	captivity	Central Park Zoo
<i>frontatus</i>	LSUMZ93856	M		Dpto. La Libertad, Chagual, Rio Marañon, 30 km E Aricapampa, 1050 m, Peru
<i>frontatus</i>	LSUMZ114313	F		Dpto. Lambayuegue, Las Pampas, km 885 Pan-American, 11 road km N Olmas, 150m, Peru
<i>wagleri</i>	FMNH337766	M		Portachuelo Pass, Aragua, Venezuela
<i>wagleri</i> complex	FMNH347539	NA	captivity	Brookfield Zoo
<i>wagleri</i>	FMNH337767	M		Portachuelo Pass, Aragua, Venezuela
<i>holochlorus</i> complex	USNM346173	NA	captivity	New York, Zoological Park
<i>holochlorus</i> complex	USNM322297	M	captivity	New York, Zoological Park
<i>holochlorus</i> complex	USNM358093	F	captivity	Schmid's Inc
<i>holochlorus</i> complex	BMNH1869.12.22.2	F	captivity	Mexico
<i>holochlorus</i> complex	BMNHs/1991.44.10	NA	captivity	NA
<i>holochlorus</i> complex	BMNHs/1991.1.32	NA	died in transit	NA
<i>h. holochlorus</i>	LSUMZ168096	F	captivity	Texas
<i>h. holochlorus</i>	LSUMZ113239	M		Tamaulipas, 7 km SW La Purisima, Mexico
<i>h. holochlorus</i>	FMNH317857	F		Chiapa de Corzo, Chiapas, Mexico
<i>holochlorus</i> complex	FMNH379147	F	captivity	Busch Gardens
<i>rubritorquis</i>	FMNH376410	M		Volcan Santiago, Masaya, Nicaragua
<i>h. holochlorus</i>	FMNH337765	M		Piedras negras, Veracruz, Mexico
<i>finschi</i>	USNM613366	M		Bocas del Toro, Panama. Cayo Agua

				near Punta Limon
<i>finschi</i>	USNM613365	F		Bocas del Toro, Panama. Cayo Agua near Punta Limon
<i>finschi</i>	USNM612288	F		Bocas del Toro, Panama, Quebrada Pastores
<i>finschi</i>	USNM612287	M		Bocas del Toro, Panama, Isla Cristobal, Bocatorito
<i>finschi</i>	LSUMZ166372	F		prov. Alajuelai near Canalete, 10°48'N, 85°01'W, 190 m, Costa Rica
<i>finschi</i>	LSUMZ48553	F		Prov. Heredia, 2 mi SE Puerto Viejo, Costa Rica
<i>strenuus</i>	USMN 343478	F		Tecpam, Guatemala
<i>hockingi</i>	LSUMZ77786	M		Dpto. Huanuco, below Bosque Zapatagocha, above Acomayo, Peru
<i>I. leucophthalmus</i>	USNM344612	M	captivity	New York, Zoological Park
<i>I. leucophthalmus</i>	USNM345867	M		Bt. Caceres & Concepcion, Brazil
<i>I. leucophthalmus</i>	USNM344083	M		Carapito, Venezuela
<i>I. leucophthalmus</i>	USNM609517	M	immature	Corrientes, Argentina. 45 km S, Manuel Derqui, 25°50'30"S, 058°48'42"W, 200m
<i>leucophthalmus</i>	USNM343822	M	captivity	Natural Zoological Park
<i>leucophthalmus</i> complex	MZUSP89308	M		NA
<i>I. leucophthalmus</i>	AMNH6671	F		Argentina, misiones, 8 km SW São Pedro
<i>leucophthalmus</i> complex	AMNH2361	NA	captivity	New York, Zoological Park
<i>leucophthalmus</i> complex	MZUSP89309	M		NA
<i>leucophthalmus</i> complex	LSUMZ161193	NA	captivity	São Paulo Zoo, Brazil
<i>I. leucophthalmus</i>	LSUMZ125700	M		Dpto. Santa Cruz, Prov. Nuflo de Chaves, 28 km by road S San Javier, 375 m, Bolivia
<i>I. leucophthalmus</i>	LSUMZ125699	M		Dpto. Beni, Prov. Gral. Ballivian, 10 km by road SW San Borja, 450 m, Bolivia
<i>I. leucophthalmus</i>	LSUMZ125698	F		Dpto. Beni, Prov. Gral. Ballivian, 10 km by road SW San Borja, 450 m, Bolivia
<i>I. leucophthalmus</i>	LSUMZ125697	F		Dpto. Beni, Prov. Gral. Ballivian, 10 km by road SW San Borja, 450 m, Bolivia
<i>I. leucophthalmus</i>	LSUMZ125696	F		Dpto. Beni, Prov. Gral. Ballivian, 10 km by road SW San Borja, 450 m, Bolivia
<i>I. callogeny</i>	LSUMZ62744	M		Dpto. Loreto, rio Caranaja, Balta, ca 300m, Peru
<i>I. callogeny</i>	LSUMZ73061	F		Dpto. Huanuco, ca 35 km NE Tingo Maria, Hac. Sta. Elena, ca 1000m,

				Peru
<i>I. leucophthalmus</i>	FMNH290911	NA		Argentina
<i>I. leucophthalmus</i>	FMNH290913	M		Argentina
<i>I. callogenys</i>	FMNH320428	M		Hacienda Amazonia, Madre de Dios, Peru
<i>I. callogenys</i>	FMNH320427	F		Hacienda Amazonia, Madre de Dios, Peru
<i>I. leucophthalmus</i>	BMNH1903.12.20.237	M		Sierra da Chapada, P. Sladen
<i>I. leucophthalmus</i>	BMNH1903.12.20.236	M		Sierra da Chapada, P. Sladen
<i>euops</i>	USNM557503	M		Sierra de Cubitas, Los Cuevas del Indio, Cuba
<i>euops</i>	USNM320005	M	trunk	NA
<i>euops</i>	USNM346686	M	captivity	Natural Zoological Park
<i>euops</i>	USNM320209	M	trunk	E.S. Schmid
<i>euops</i>	AMNH1040	M	captivity	Central Park Zoo
<i>euops</i>	AMNH3662	NA	captivity	New York, Zoological Park
<i>erythrognys</i>	AMNH18380	M		NA
<i>erythrognys</i>	AMNH18377	M		NA
<i>erythrognys</i>	AMNH18373	M		NA
<i>erythrognys</i>	AMNH18378	F		NA
<i>erythrognys</i>	AMNH18376	M		NA
<i>erythrognys</i>	AMNH18379	M		NA
<i>erythrognys</i>	AMNH18375	M		NA
<i>erythrognys</i>	AMNH14310	F	captivity	Peru, Novak's Aviary
<i>erythrognys</i>	AMNH18374	M		NA
<i>erythrognys</i>	AMNH14311	M	captivity	Peru, Novak's Aviary
<i>erythrognys</i>	AMNH2563	NA	captivity	New York, Zoological Park
<i>erythrognys</i>	BMNHs/1985.67.2	M	captivity	G. Smith
<i>erythrognys</i>	BMNHs/1997.48.2	NA	captivity	G. Smith
<i>erythrognys</i>	BMNHs/1972.1.80	NA		Ecuador
<i>erythrognys</i>	LSUMZ97460	F		Dpto. Piura, km 34 on Olmos-Bagua Chica Hwy, 4200 ft, Peru
<i>erythrognys</i>	LSUMZ86456	M		Dpto. Rura, 46 rd km SW Ayacaba on Rio Quiroz 2250, Peru
<i>erythrognys</i>	LSUMZ86455	M		Dpto. Lambayegue, 12 Rd km N Olmos, Peru
<i>erythrognys</i>	LSUMZ77709	NA		Dpto. Tumbes, Riva Playa, rio Tumbes, Peru
<i>erythrognys</i>	LSUMZ75596	F		Dpto. Tumbes, Riva Playa, rio Tumbes, Peru
<i>erythrognys</i>	FMNH337768	NA	captivity	Dept. Agriculture
<i>erythrognys</i>	FMNH342702	NA	captivity	R and L exotic birds
<i>chloropterus</i>	USNM226537	M		El Rio, Dominican Republic
<i>chloropterus</i>	USNM292565	M		Cerca La Source, Haiti
<i>chloropterus</i>	USNM292566	F		Cerca La Source, Haiti
<i>chloropterus</i>	USNM227068	F		Fonds Parisien, Haiti

<i>chloropterus</i>	USNM290994	NA		Massif de la Selle, Haiti
<i>chloropterus</i>	USNM291570	M	captivity	Natural Zoological Park
<i>chloropterus</i>	USNM226538	NA		Constanza, Saint Domingo
<i>chloropterus</i>	AMNH2581	M	captivity	New York, Zoological Park
<i>chloropterus</i>	FMNH350812	F	captivity	T. Silva
<i>chloropterus</i>	FMNH337772	M	captivity	Busch Gardens
<i>chloropterus</i>	FMNH337771	M	captivity	Busch Gardens

Appendix 3. Morphological characters examined for species of the genus *Psittacara*, coded according to the catalogue of Smithe.

Character	<i>P. leucophthalmus</i>	<i>P. holochlorus</i>	<i>P. brevipes</i>	<i>P. rubritorquis</i>
Bill	Pale Pinkish Buff 121D	Pale Pinkish Buff 121D	Pale Pinkish Buff 121D	Pale Pinkish Buff 121D
Tarsus	Flesh Color 5	Flesh Color 5	Flesh Color 5	Flesh Color 5
Periophthalmic ring	White	White	White	White
Area around eye	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Forehead	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Crown	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Nape	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260 with scattered Scarlet 14 feathers
Cheeks	Lime Green 159 with scattered Scarlet 14	Lime Green 159	Lime Green 159	Lime Green 159 with scattered Scarlet 14 feathers
Auriculars	Lime Green 159 with scattered Scarlet 14 feathers	Lime Green 159	Lime Green 159	Lime Green 159
Upper throat	Lime Green 159 with scattered Scarlet 14 feathers	Lime Green 159 with scattered Scarlet 14 feathers	Lime Green 159	Scarlet 14 mixed with Spectrum Yellow 55
Throat	Lime Green 159 with scattered Scarlet 14 feathers	Lime Green 159 with scattered Scarlet 14 feathers	Lime Green 159	Scarlet 14 mixed with Spectrum Yellow 55
Dorsal neck	Parrot Green 260 with scattered Scarlet 14 feathers	Parrot Green 260	Parrot Green 260	Parrot Green 260
Scapulars	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Lesser underwing-coverts	Scarlet 14	Yellow-Green 58	Yellow-Green 58	Yellow-Green 58
Greater underwing-coverts	Spectrum Yellow 55	Yellow-Green 58	Yellow-Green 58	Yellow-Green 58
Bend of wing	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Lesser wing-coverts	Parrot Green 260 with Scarlet 14 edge	Parrot Green 260	Parrot Green 260	Parrot Green 260
Median wing-coverts	Parrot Green 260 with Scarlet 14 edge	Parrot Green 260	Parrot Green 260	Parrot Green 260
Carpal edge	Parrot Green 260 and Scarlet 14	Parrot Green 260	Parrot Green 260	Parrot Green 260
Gr. Primary coverts	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Gr. Secondary coverts	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Folded secondaries	Parrot Green 260	Lime Green 159	Lime Green 159	Lime Green 159

Character	<i>P. leucophthalmus</i>	<i>P. holochlorus</i>	<i>P. brevipes</i>	<i>P. rubritorquis</i>
Rump	Lime Green 159	Lime Green 159	Lime Green 159	Lime Green 159
Breast	Lime Green 159	Lime Green 159	Lime Green 159	Lime Green 159
Belly	Lime Green 159	Lime Green 159	Lime Green 159	Lime Green 159
Crural feathers	Lime Green 159 with scattered Scarlet 14 feathers	Lime Green 159	Lime Green 159	Lime Green 159
Primaries	Parrot Green 260 with Jet Black 89 edges	Parrot Green 260 with Jet Black 89 edges	Parrot Green 260 with Jet Black 89 edges	Parrot Green 260 with Jet Black 89 edges
Secondaries	Parrot Green 260 with Jet Black 89 edges	Parrot Green 260 with Jet Black 89 edges	Parrot Green 260 with Jet Black 89 edges	Parrot Green 260 with Jet Black 89 edges
Underwing-coverts	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43
Uppertail	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Undertail	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43

Character	<i>P. finschi</i>	<i>P. euops</i>	<i>P. chloropterus</i>	<i>P. maugei</i>
Bill	Pale Pinkish Buff 121D	Pale Pinkish Buff 121D	Pale Pinkish Buff 121D	Pale Pinkish Buff 121D
Tarsus	Flesh Color 5	Flesh Color 5	Flesh Color 5	Flesh Color 5
Periophthalmic ring	White	White	White	White
Area around eye	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Forehead	Maroon 31	Parrot Green 260	Parrot Green 260	Parrot Green 260
Crown	Scarlet 14 and Parrot Green 260	Parrot Green 260 with scattered Scarlet 14 feathers	Parrot Green 260	Parrot Green 260
Nape	Parrot Green 260	Parrot Green 260 with scattered Scarlet 14 feathers	Parrot green 260	Parrot Green 260
Cheeks	Lime Green 159 with scattered Scarlet 14 feathers	Lime Green 159 with scattered Scarlet 14 feathers	Lime Green 159	Lime Green 159
Auriculars	Lime Green 159 with scattered Scarlet 14 feathers	Lime Green 159 with scattered Scarlet 14 feathers	Lime Green 159	Lime Green 159
Upper throat	Lime Green 159 with scattered Scarlet 14 feathers	Lime Green 159 with scattered Scarlet 14 feathers	Lime Green 159	Lime Green 159
Throat	Lime Green 159 with scattered Scarlet 14 feathers	Lime Green 159 with scattered Scarlet 14 feathers	Lime Green 159	Lime Green 159
Dorsal neck	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Scapulars	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Lesser underwing-coverts	Scarlet 14	Scarlet 14	Scarlet 14	Scarlet 14 mixed with Spectrum Yellow 55
Greater underwing-coverts	Spectrum Yellow 55	Yellow-Green 58	Scarlet 14 with Spectrum Yellow 55 edges	Scarlet 14 mixed with Spectrum Yellow 55
Bend of wing	Scarlet 14	Scarlet 14	Scarlet 14	Parrot Green 260
Lesser wing-coverts	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260

Character	<i>P. finschi</i>	<i>P. euops</i>	<i>P. chloropterus</i>	<i>P. maugaei</i>
Median wing-coverts	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Carpal edge	Scarlet 14	Scarlet 14	Scarlet 14	Scarlet 14
Gr. Primary coverts	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Gr. Secondary coverts	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Folded secondaries	Parrot Green 260	Parrot Green 260	Parrot Green 260	Lime Green 159
Rump	Lime Green 159	Lime Green 159	Lime Green 159	Lime Green 159
Breast	Lime Green 159	Lime Green 159 with scattered Scarlet 14 feathers	Lime Green 159	Lime Green 159
Belly	Lime Green 159	Lime Green 159 with scattered Scarlet 14 feathers	Lime Green 159	Lime Green 159
Crural feathers	Lime Green 159	Lime Green 159 with scattered Scarlet 14 feathers	Lime Green 159	Lime Green 159
Primaries	Parrot Green 260 with Jet Black 89 edges	Parrot Green 260 with Jet Black 89 edges	Parrot Green 260 with Jet Black 89 edges	Parrot Green 260 with Jet Black 89 edges
Secondaries	Parrot Green 260 with Jet Black 89 edges	Parrot Green 260 with Jet Black 89 edges	Parrot Green 260 with Jet Black 89 edges	Parrot Green 260 with Jet Black 89 edges
Underwing-coverts	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43
Uppertail	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Undertail	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43

Character	<i>P. wagleri</i>	<i>P. frontatus</i>	<i>P. alticolus</i>	<i>P. erythrogenys</i>
Bill	Pale Pinkish Buff 121D	Pale Pinkish Buff 121D	Pale Pinkish Buff 121D	Pale Pinkish Buff 121D
Tarsus	Flesh Color 5	Flesh Color 5	Flesh Color 5	Flesh Color 5
Periophthalmic ring	White	White	White	White
Area around eye	Parrot Green 260	Parrot Green 260 and Scarlet 14	Parrot Green 260 with scattered Scarlet 14 feathers	Scarlet 14
Forehead	Maroon 31	Scarlet 14	Maroon 31 and Scarlet 14	Maroon 31
Crown	Scarlet 14	Scarlet 14	Parrot Green 260	Scarlet 14
Nape	Parrot Green 260	Parrot Green 260	Parrot Green 260	Scarlet 14
Cheeks	Lime Green 159	Lime Green 159	Lime Green 159 with scattered Scarlet 14 feathers	Scarlet 14
Auriculars	Lime Green 159 with scattered Scarlet 14 feathers	Lime Green 159	Lime Green 159	Scarlet 14
Upper throat	Lime Green 159 with scattered Scarlet 14 feathers	Lime Green 159	Lime Green 159	Lime Green 159 with scattered Scarlet 14 feathers
Throat	Lime Green 159	Lime Green 159	Lime Green 159	Lime Green 159
Dorsal neck	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Scapulars	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260

Character	<i>P. wagleri</i>	<i>P. frontatus</i>	<i>P. alticolus</i>	<i>P. erythrogenys</i>
Lesser underwing-coverts	Yellow-Green 58	Scarlet 14	Yellow-Green 58	Scarlet 14
Greater underwing-coverts	Yellow-Green 58	Yellow-Green 58	Yellow-Green 58	Yellow-Green 58
Bend of wing	Parrot Green 260	Scarlet 14	Parrot Green 260	Scarlet 14
Lesser wing-coverts	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Median wing-coverts	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Carpal edge	Parrot Green 260	Scarlet 14	Parrot Green 260	Scarlet 14
Gr. Primary coverts	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Gr. Secondary coverts	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Folded secondaries	Lime Green 159	Lime Green 159	Parrot Green 260	Parrot Green 260
Rump	Lime Green 159	Lime Green 159	Lime Green 159	Lime Green 159
Breast	Lime Green 159	Lime Green 159	Lime Green 159	Lime Green 159
Belly	Lime Green 159	Lime Green 159	Lime Green 159	Lime Green 159
Crural feathers	Lime Green 159 with scattered Scarlet 14 feathers	Scarlet 14	Lime Green 159	Lime Green 159 with scattered Scarlet 14 feathers
Primaries	Parrot Green 260 with Jet Black 89 edges	Parrot Green 260 with Jet Black 89 edges	Parrot Green 260 with Jet Black 89 edges	Parrot Green 260 with Jet Black 89 edges
Secondaries	Parrot Green 260 with Jet Black 89 edges	Parrot Green 260 with Jet Black 89 edges	Parrot Green 260 with Jet Black 89 edges	Parrot Green 260 with Jet Black 89 edges
Underwing-coverts	Grayish Olive 43	Parrot Green 260	Grayish Olive 43	Grayish Olive 43
Uppertail	Parrot Green 260	Parrot Green 260	Parrot Green 260	Parrot Green 260
Undertail	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43	Grayish Olive 43

Character	<i>P. chlorogenys</i>	<i>P. mitratus</i>
Bill	Pale Pinkish Buff 121D	Pale Pinkish Buff 121D
Tarsus	Flesh Color 5	Flesh Color 5
Periophthalmic ring	White	White
Area around eye	scattered Scarlet 14 feathers	Scarlet 14
Forehead	Maroon 31	Maroon 31
Crown	Parrot Green 260 and Scarlet 14	Parrot Green 260 and Scarlet 14
Nape	Parrot Green 260	Parrot Green 260
Cheeks	Lime Green 159 with scattered Scarlet 14 feathers	Scarlet 14
Auriculars	Lime Green 159 with scattered Scarlet 14 feathers	Lime Green 159 with scattered Scarlet 14 feathers
Upper throat	Lime Green 159 with few Scarlet 14 feathers	Lime Green 159 with scattered Scarlet 14 feathers
Throat	Lime Green 159	Lime Green 159 with scattered Scarlet 14 feathers

Character	<i>P. chlorogenys</i>	<i>P. mitratus</i>
Dorsal neck	Parrot Green 260 with scattered Scarlet 14 feathers	Parrot Green 260 with scattered Scarlet 14 feathers
Scapulars	Parrot Green 260	Parrot Green 260
Lesser underwing- coverts	Yellow-Green 58	Yellow-Green 58
Greater underwing- coverts	Yellow-Green 58	Yellow-Green 58
Bend of wing	Parrot Green 260	Parrot Green 260
Lesser wing- coverts	Parrot Green 260	Parrot Green 260
Median wing- coverts	Parrot Green 260	Parrot Green 260
Carpal edge	Parrot Green 260	Parrot Green 260
Gr. Primary coverts	Parrot Green 260	Parrot Green 260
Gr. Secondary coverts	Parrot Green 260	Parrot Green 260
Folded secondaries	Parrot Green 260	Parrot Green 260
Rump	Lime Green 159	Lime Green 159
Breast	Lime Green 159	Lime Green 159
Belly	Lime Green 159	Lime Green 159
Crural feathers	Scarlet 14	Scarlet 14
Primaries	Parrot Green 260 with Jet Black 89 edges	Parrot Green 260 with Jet Black 89 edges
Secondaries	Parrot Green 260 with Jet Black 89 edges	Parrot Green 260 with Jet Black 89 edges
Underwing- coverts	Grayish Olive 43	Grayish Olive 43
Uppertail	Parrot Green 260	Parrot Green 260
Undertail	Grayish Olive 43	Grayish Olive 43

Appendix 4. List of osteological characters examined, with reference to the author, when the character was taken from the literature.

Character	Character state	Author
orbit	complete/incomplete	Machado <i>et al.</i> 2006, Alvarenga 2007, Tokita 2003, Tokita <i>et al.</i> 2007
<i>proc. zygomaticus</i> length	short/medium	Machado <i>et al.</i> 2006, Gaban-Lima 2007
<i>proc. zygomaticus</i> shape	rounded/pointed	
<i>proc. lacrimalis</i> shape	rounded/pointed	
ridge on <i>fossa temporalis</i>	present/absent	
deep <i>fossa temporalis</i>	present/absent	
marked foramina in the supraorbital region	present/absent	
marked <i>crista nuchalis transversa</i>	present/absent	
<i>crista nuchalis transversa</i> shape	M/reverse U	Brito 2008
<i>crista nuchalis transversa</i> reaching the <i>proc. paraoccipitalis</i>	present/absent	
<i>proc. paraoccipitalis</i> shape	rounded/pointed	Brito 2008
ridge on <i>ala parasphenoidalis</i>	present/absent	
<i>arcus suborbitalis</i> touching the <i>arcus jugalis</i>	present/absent	
<i>fenestra antorbitalis</i> shape	rounded/triangular	
lacrimal almost closing the antorbital fenestra	present/absent	
<i>rostrum maxillae</i> shape	isosceles triangle/equilateral triangle	
<i>proc. retroarticularis</i> shape	triangular obtuse/ triangular acute	Gaban-Lima 2007
indent on median portion of the <i>proc. orbitalis</i> of the lacrimal	present/absent	Brito 2008
<i>foramen pneumaticum palatini</i> size	small/large	
space between <i>os maxillare</i> and <i>os palatinum</i>	present/absent	
notch on region of the <i>os maxillare</i>	present/absent	
contact region between the pterygoid and caudal portion of <i>os palatinum</i>	present/absent	
<i>crista</i> of the median portion of <i>os palatinum</i> touching the pterygoid	present/absent	
<i>fenestra caudalis mandibulae</i> presence	present/absent	Gaban-Lima 2007
<i>fenestra rostralis mandibulae</i> presence	present/absent	Gaban-Lima 2007
<i>proc. medialis mandibulae</i> shape	pointed/rounded	Gaban-Lima 2007
<i>foramen obturatum</i>	open/closed	
<i>ala preacetabularis ilii</i> shape	rounded/pointed	
prominent <i>tuberculum preacetabulare</i>	present/absent	
<i>sutura iliosynsacralis</i> shape	open/closed	
<i>proc. marginis caudalis</i> shape	rounded/pointed	
<i>spina externa rostri</i> shape	thick/thin	
<i>proc. craniolateralis</i> shape	rounded/pointed	
<i>apex carinae</i> shape	rounded/pointed	

Character	Character state	Author
<i>tuberculum cristae medianae</i>	present/absent	
<i>pila coracoidea</i> with V shape	present/absent	
<i>margo caudalis</i> shape	triangular/squared	
prominent <i>tuberculum supracondylare ventrale</i>	present/absent	
<i>pons supratendineus</i> ossification	completely ossified/incompletely ossified	Mayr 2010
<i>spina fibulae</i> ending at <i>crista fibularis</i> level	present/absent	

Appendix 5. Pairwise comparisons between pairs of taxa reported in the literature, using Wilcoxon rank sum test, for 4 morphometric parameters. Ns = no significant difference; <0.05 = significant difference.

Taxa	Culmen	Bill width	Wing	Tarsus
<i>leucophthalmus-alticolus</i>	Ns	Ns	Ns	Ns
<i>leucophthalmus-brevipes</i>	<0.0001	<0.05	<0.05	<0.05
<i>leucophthalmus-brewsteri</i>	Ns	Ns	Ns	Ns
<i>leucophthalmus-callogenys</i>	<0.0001	<0.0001	<0.05	<0.05
<i>leucophthalmus-chlorogenys</i>	<0.05	<0.05	<0.05	Ns
<i>leucophthalmus-chloropterus</i>	Ns	<0.0001	Ns	<0.001
<i>leucophthalmus-erythrognys</i>	<0.0001	<0.0001	<0.05	<0.001
<i>leucophthalmus-euops</i>	<0.0001	<0.0001	<0.0001	<0.001
<i>leucophthalmus-finschi</i>	Ns	Ns	<0.0001	<0.001
<i>leucophthalmus-frontatus</i>	<0.05	<0.05	<0.05	Ns
<i>leucophthalmus-hockingi</i>	<0.05	<0.05	Ns	<0.05
<i>leucophthalmus-holochlorus</i>	Ns	<0.0001	<0.0001	<0.001
<i>leucophthalmus-maugei</i>	Ns	Ns	Ns	Ns
<i>leucophthalmus-minor</i>	<0.05	<0.05	<0.0001	Ns
<i>leucophthalmus-mitratus</i>	<0.0001	<0.0001	<0.0001	<0.001
<i>leucophthalmus-propinquus</i>	Ns	Ns	Ns	Ns
<i>leucophthalmus-rubritorquis</i>	<0.05	<0.0001	<0.0001	<0.001
<i>leucophthalmus-strenuus</i>	<0.0001	Ns	Ns	Ns
<i>leucophthalmus-transilis</i>	Ns	Ns	Ns	<0.05
<i>leucophthalmus-tucumanus</i>	<0.0001	<0.0001	<0.0001	Ns
<i>leucophthalmus-wagleri</i>	<0.0001	<0.0001	<0.0001	<0.05
<i>brevipes-alticolus</i>	Ns	Ns	Ns	Ns
<i>brevipes – brewsteri</i>	Ns	Ns	Ns	Ns
<i>brevipes –callogenys</i>	Ns	Ns	<0.0001	<0.05
<i>brevipes –chlorogenys</i>	<0.05	<0.05	<0.05	Ns
<i>brevipes –chloropterus</i>	<0.05	Ns	Ns	Ns
<i>brevipes –erythrognys</i>	Ns	Ns	Ns	Ns
<i>brevipes –euops</i>	<0.0001	<0.0001	<0.0001	<0.0001

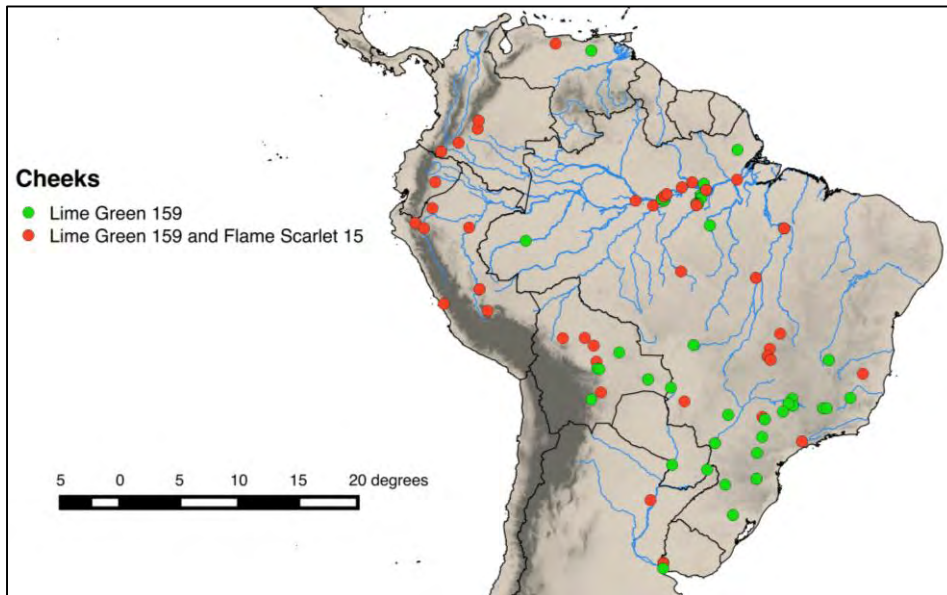
Taxa	Culmen	Bill width	Wing	Tarsus
<i>brevipes –finschi</i>	<0.0001	Ns	Ns	Ns
<i>brevipes –frontatus</i>	<0.05	Ns	<0.05	Ns
<i>brevipes –hockingi</i>	<0.05	<0.05	<0.05	<0.05
<i>brevipes –holochlorus</i>	<0.0001	<0.0001	Ns	Ns
<i>brevipes –maugei</i>	Ns	Ns	Ns	Ns
<i>brevipes –minor</i>	Ns	Ns	<0.05	Ns
<i>brevipes –mitratus</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>brevipes –propinquus</i>	Ns	Ns	Ns	Ns
<i>brevipes –rubritorquis</i>	<0.0001	<0.0001	<0.05	Ns
<i>brevipes –strenuus</i>	Ns	Ns	<0.0001	Ns
<i>brevipes –transilis</i>	<0.05	Ns	<0.05	Ns
<i>brevipes –tucumanus</i>	<0.05	<0.05	<0.05	<0.05
<i>brevipes-wagleri</i>	Ns	Ns	<0.0001	<0.05
<i>brewsteri-alticolus</i>	Ns	Ns	Ns	Ns
<i>brewsteri –callogenys</i>	Ns	Ns	Ns	Ns
<i>brewsteri –chlorogenys</i>	Ns	Ns	Ns	Ns
<i>brewsteri –chloropterus</i>	Ns	<0.0001	Ns	Ns
<i>brewsteri –erythrogenys</i>	Ns	Ns	Ns	Ns
<i>brewsteri –euops</i>	Ns	Ns	Ns	Ns
<i>brewsteri –finschi</i>	Ns	Ns	Ns	Ns
<i>brewsteri –frontatus</i>	Ns	Ns	Ns	Ns
<i>brewsteri –hockingi</i>	Ns	Ns	Ns	Ns
<i>brewsteri –holochlorus</i>	Ns	Ns	Ns	Ns
<i>brewsteri –maugei</i>	Ns	Ns	Ns	Ns
<i>brewsteri –minor</i>	Ns	Ns	Ns	Ns
<i>brewsteri –mitratus</i>	Ns	Ns	Ns	Ns
<i>brewsteri –propinquus</i>	Ns	Ns	Ns	Ns
<i>brewsteri –rubritorquis</i>	Ns	Ns	Ns	Ns
<i>brewsteri –strenuus</i>	Ns	Ns	Ns	Ns
<i>brewsteri –transilis</i>	Ns	Ns	Ns	Ns
<i>brewsteri –tucumanus</i>	Ns	Ns	Ns	Ns
<i>brewsteri –wagleri</i>	Ns	Ns	Ns	Ns
<i>callogenys –finschi</i>	<0.0001	<0.05	<0.0001	<0.0001
<i>callogenys-frontatus</i>	Ns	Ns	<0.05	Ns
<i>callogenys-hockingi</i>	<0.05	<0.05	<0.05	Ns
<i>callogenys-holochlorus</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>callogenys-maugei</i>	Ns	Ns	Ns	Ns
<i>callogenys-alticolus</i>	Ns	Ns	Ns	Ns
<i>callogenys-chlorogenys</i>	Ns	<0.05	<0.05	Ns
<i>callogenys-chloropterus</i>	<0.05	<0.0001	Ns	<0.0001
<i>callogenys-erythrogenys</i>	Ns	Ns	<0.0001	<0.0001
<i>callogenys-euops</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>callogenys –minor</i>	Ns	Ns	<0.0001	Ns
<i>callogenys –mitratus</i>	<0.0001	<0.0001	<0.0001	Ns
<i>callogenys –propinquus</i>	Ns	Ns	Ns	Ns
<i>callogenys –rubritorquis</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>callogenys –strenuus</i>	Ns	Ns	Ns	Ns
<i>callogenys –transilis</i>	Ns	Ns	Ns	Ns
<i>callogenys –tucumanus</i>	<0.05	<0.05	Ns	Ns
<i>callogenys-wagleri</i>	Ns	Ns	Ns	Ns

Taxa	Culmen	Bill width	Wing	Tarsus
<i>chlorogenys-alticolus</i>	Ns	Ns	Ns	Ns
<i>chlorogenys-chloropterus</i>	<0.05	<0.05	<0.05	<0.05
<i>chlorogenys-erythrogenys</i>	<0.05	Ns	<0.05	<0.05
<i>chlorogenys-euops</i>	<0.05	<0.05	<0.05	<0.05
<i>chlorogenys-finschi</i>	<0.0001	<0.05	<0.05	<0.05
<i>chlorogenys-frontatus</i>	Ns	<0.05	Ns	Ns
<i>chlorogenys-hockingi</i>	Ns	Ns	Ns	Ns
<i>chlorogenys-holochlorus</i>	<0.05	<0.05	<0.05	<0.05
<i>chlorogenys-maugei</i>	Ns	Ns	Ns	Ns
<i>chlorogenys-minor</i>	<0.05	Ns	Ns	Ns
<i>chlorogenys-mitratus</i>	Ns	Ns	Ns	Ns
<i>chlorogenys-propinquus</i>	Ns	Ns	Ns	Ns
<i>chlorogenys-rubritorquis</i>	<0.05	<0.05	<0.05	Ns
<i>chlorogenys-strenuus</i>	<0.05	<0.05	<0.05	Ns
<i>chlorogenys-transilis</i>	<0.05	<0.05	Ns	Ns
<i>chlorogenys-tucumanus</i>	Ns	Ns	Ns	Ns
<i>chlorogenys-wagleri</i>	<0.05	<0.05	<0.05	Ns
<i>chloropterus-alticolus</i>	Ns	Ns	Ns	Ns
<i>chloropterus-erythrogenys</i>	Ns	<0.0001	Ns	Ns
<i>chloropterus-euops</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>chloropterus-finschi</i>	Ns	Ns	<0.0001	Ns
<i>chloropterus-frontatus</i>	<0.05	Ns	<0.05	Ns
<i>chloropterus-hockingi</i>	<0.05	<0.05	<0.05	<0.05
<i>chloropterus-holochlorus</i>	Ns	Ns	Ns	Ns
<i>chloropterus-maugei</i>	Ns	Ns	Ns	Ns
<i>chloropterus-minor</i>	<0.05	<0.0001	<0.0001	<0.05
<i>chloropterus-mitratus</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>chloropterus-propinquus</i>	Ns	Ns	Ns	Ns
<i>chloropterus-rubritorquis</i>	<0.05	Ns	<0.0001	Ns
<i>chloropterus-strenuus</i>	Ns	<0.0001	<0.05	<0.05
<i>chloropterus-transilis</i>	Ns	<0.05	Ns	Ns
<i>chloropterus-tucumanus</i>	<0.05	<0.05	<0.05	<0.05
<i>chloropterus-wagleri</i>	Ns	<0.0001	<0.0001	<0.0001
<i>erythrogenys-alticolus</i>	Ns	Ns	Ns	Ns
<i>erythrogenys-euops</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>erythrogenys-finschi</i>	<0.05	Ns	<0.05	Ns
<i>erythrogenys-frontatus</i>	<0.05	<0.05	<0.05	Ns
<i>erythrogenys-hockingi</i>	<0.05	<0.05	<0.05	<0.05
<i>erythrogenys-holochlorus</i>	<0.0001	<0.0001	Ns	Ns
<i>erythrogenys-maugei</i>	Ns	Ns	Ns	Ns
<i>erythrogenys-minor</i>	Ns	Ns	<0.0001	Ns
<i>erythrogenys-mitratus</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>erythrogenys-propinquus</i>	Ns	Ns	Ns	Ns
<i>erythrogenys-rubritorquis</i>	<0.0001	<0.0001	<0.0001	<0.05
<i>erythrogenys-strenuus</i>	Ns	Ns	<0.05	Ns
<i>erythrogenys-transilis</i>	Ns	Ns	Ns	Ns
<i>erythrogenys-tucumanus</i>	<0.05	<0.05	<0.05	Ns
<i>erythrogenys-wagleri</i>	Ns	Ns	<0.0001	<0.05
<i>euops-alticolus</i>	Ns	Ns	Ns	Ns
<i>euops-finschi</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>euops-frontatus</i>	<0.05	<0.05	<0.05	<0.0001

Taxa	Culmen	Bill width	Wing	Tarsus
<i>euops -hockingi</i>	<0.05	Ns	<0.05	<0.05
<i>euops -holochlorus</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>euops -maugei</i>	<0.05	<0.05	<0.05	Ns
<i>euops -minor</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>euops -mitratus</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>euops -propinquis</i>	Ns	Ns	Ns	Ns
<i>euops -rubritorquis</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>euops -strenuus</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>euops -transilis</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>euops -tucumanus</i>	<0.05	<0.05	<0.05	<0.05
<i>euops -wagleri</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>finschi -alticolus</i>	<0.05	Ns	Ns	Ns
<i>finschi -frontatus</i>	<0.0001	<0.05	<0.05	Ns
<i>finschi -hockingi</i>	<0.0001	<0.05	<0.05	<0.05
<i>finschi -holochlorus</i>	Ns	Ns	<0.05	Ns
<i>finschi -maugei</i>	Ns	Ns	Ns	Ns
<i>finschi -minor</i>	<0.05	<0.05	<0.0001	<0.05
<i>finschi -mitratus</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>finschi -propinquis</i>	Ns	Ns	Ns	Ns
<i>finschi -rubritorquis</i>	Ns	<0.05	Ns	Ns
<i>finschi -strenuus</i>	<0.0001	Ns	<0.0001	<0.05
<i>finschi -transilis</i>	Ns	Ns	<0.05	Ns
<i>finschi -tucumanus</i>	<0.0001	<0.05	<0.05	<0.05
<i>finschi -wagleri</i>	<0.05	<0.05	<0.0001	<0.0001
<i>frontatus -alticolus</i>	Ns	Ns	Ns	Ns
<i>frontatus -hockingi</i>	Ns	Ns	Ns	Ns
<i>frontatus -holochlorus</i>	<0.05	<0.05	<0.05	Ns
<i>frontatus -maugei</i>	Ns	Ns	Ns	Ns
<i>frontatus -minor</i>	Ns	Ns	Ns	Ns
<i>frontatus -mitratus</i>	Ns	Ns	Ns	Ns
<i>frontatus -propinquis</i>	Ns	Ns	Ns	Ns
<i>frontatus -rubritorquis</i>	<0.05	<0.05	<0.05	Ns
<i>frontatus -strenuus</i>	<0.05	<0.05	<0.05	Ns
<i>frontatus -transilis</i>	<0.05	<0.05	Ns	Ns
<i>frontatus -tucumanus</i>	Ns	Ns	Ns	Ns
<i>frontatus -wagleri</i>	<0.05	<0.05	<0.05	Ns
<i>hockingi -alticolus</i>	Ns	Ns	Ns	Ns
<i>hockingi -holochlorus</i>	<0.05	<0.05	<0.05	<0.05
<i>hockingi -maugei</i>	Ns	Ns	Ns	Ns
<i>hockingi -minor</i>	<0.05	<0.05	Ns	Ns
<i>hockingi -mitratus</i>	Ns	Ns	Ns	Ns
<i>hockingi -propinquis</i>	Ns	Ns	Ns	Ns
<i>hockingi -rubritorquis</i>	<0.05	<0.05	<0.05	<0.05
<i>hockingi -strenuus</i>	<0.05	<0.05	<0.05	Ns
<i>hockingi -transilis</i>	<0.05	<0.05	<0.05	Ns
<i>hockingi -tucumanus</i>	Ns	Ns	Ns	Ns
<i>hockingi -wagleri</i>	<0.05	<0.0001	<0.05	Ns
<i>holochlorus -alticolus</i>	Ns	Ns	Ns	Ns
<i>holochlorus -maugei</i>	Ns	Ns	Ns	Ns
<i>holochlorus -minor</i>	<0.05	<0.0001	<0.0001	<0.05

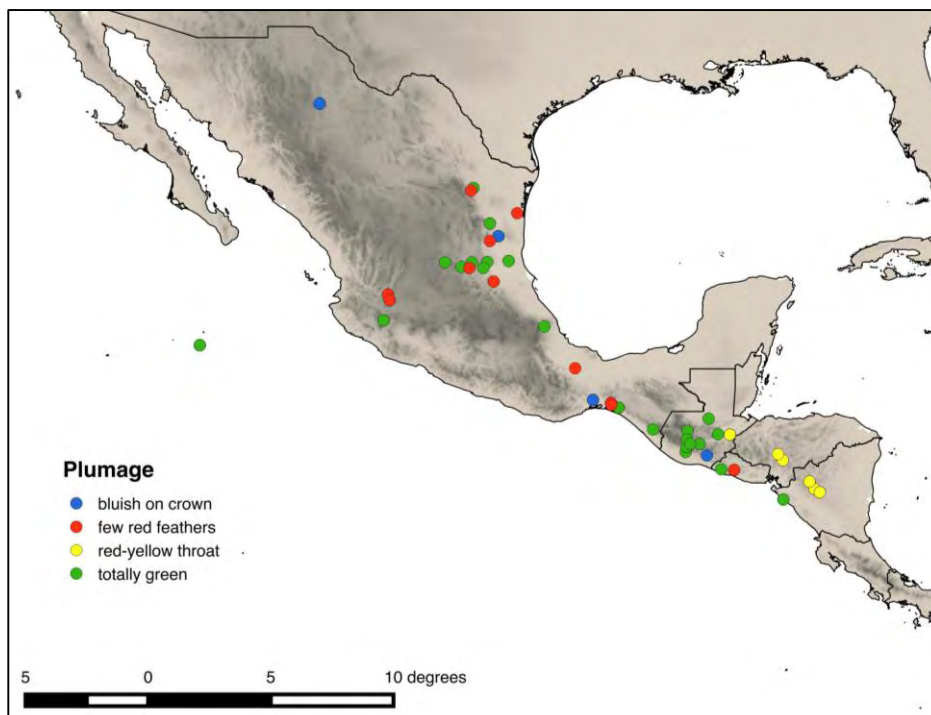
Taxa	Culmen	Bill width	Wing	Tarsus
<i>holochlorus -mitratus</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>holochlorus -propinquus</i>	Ns	Ns	Ns	Ns
<i>holochlorus -rubritorquis</i>	<0.05	Ns	<0.05	Ns
<i>holochlorus -strenuus</i>	<0.0001	<0.0001	<0.0001	<0.05
<i>holochlorus -transilis</i>	Ns	<0.05	<0.05	Ns
<i>holochlorus -tucumanus</i>	<0.05	<0.05	<0.05	<0.05
<i>holochlorus -wagleri</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>maugei-alticolus</i>	Ns	Ns	Ns	Ns
<i>maugei-minor</i>	Ns	Ns	Ns	Ns
<i>maugei -mitratus</i>	<0.05	<0.05	Ns	Ns
<i>maugei -propinquus</i>	Ns	Ns	Ns	Ns
<i>maugei -rubritorquis</i>	Ns	Ns	Ns	Ns
<i>maugei -strenuus</i>	Ns	Ns	Ns	Ns
<i>maugei -transilis</i>	Ns	Ns	Ns	Ns
<i>maugei -tucumanus</i>	Ns	Ns	Ns	Ns
<i>maugei -wagleri</i>	Ns	Ns	Ns	Ns
<i>minor-alticolus</i>	Ns	Ns	Ns	Ns
<i>minor-mitratus</i>	<0.0001	<0.0001	Ns	Ns
<i>minor -propinquus</i>	Ns	Ns	Ns	Ns
<i>minor -rubritorquis</i>	<0.05	<0.05	<0.05	<0.05
<i>minor -strenuus</i>	Ns	Ns	<0.0001	Ns
<i>minor -transilis</i>	<0.05	Ns	<0.05	Ns
<i>minor -tucumanus</i>	<0.05	<0.05	Ns	Ns
<i>minor -wagleri</i>	Ns	Ns	<0.05	Ns
<i>mitratus-alticolus</i>	Ns	Ns	Ns	Ns
<i>mitratus -propinquus</i>	Ns	Ns	Ns	Ns
<i>mitratus -rubritorquis</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>mitratus -strenuus</i>	<0.0001	<0.0001	<0.0001	Ns
<i>mitratus -transilis</i>	<0.0001	<0.05	<0.05	<0.05
<i>mitratus -tucumanus</i>	Ns	Ns	Ns	Ns
<i>mitratus -wagleri</i>	<0.0001	<0.0001	<0.0001	Ns
<i>propinquus-alticolus</i>	Ns	Ns	Ns	Ns
<i>propinquus-rubritorquis</i>	Ns	Ns	Ns	Ns
<i>propinquus-strenuus</i>	Ns	Ns	Ns	Ns
<i>propinquus-transilis</i>	Ns	Ns	Ns	Ns
<i>propinquus-tucumanus</i>	Ns	Ns	Ns	Ns
<i>propinquus-wagleri</i>	Ns	Ns	Ns	Ns
<i>rubritorquis-alticolus</i>	Ns	Ns	Ns	Ns
<i>rubritorquis-strenuus</i>	<0.0001	<0.0001	<0.0001	<0.0001
<i>rubritorquis-transilis</i>	<0.05	<0.05	<0.05	Ns
<i>rubritorquis-tucumanus</i>	<0.05	<0.05	<0.05	<0.05
<i>rubritorquis-wagleri</i>	<0.0001	<0.0001	<0.0001	<0.05
<i>strenuus-alticolus</i>	Ns	Ns	Ns	Ns
<i>strenuus-transilis</i>	Ns	Ns	Ns	Ns
<i>strenuus-tucumanus</i>	<0.05	<0.05	<0.05	<0.05
<i>strenuus-wagleri</i>	Ns	Ns	<0.05	Ns
<i>transilis-alticolus</i>	Ns	Ns	Ns	Ns
<i>transilis-tucumanus</i>	<0.05	<0.05	<0.05	Ns
<i>transilis-wagleri</i>	Ns	Ns	<0.05	Ns
<i>tucumanus-alticolus</i>	Ns	Ns	Ns	Ns
<i>tucumanus-wagleri</i>	<0.05	<0.0001	<0.05	<0.05
<i>wagleri-alticolus</i>	Ns	Ns	Ns	Ns

Appendix 6. Mapped character states showing that all races of *A. leucophthalmus* can exhibit scattered red feathers on cheeks. Red: Lime Green 159 and Scarlet 14, green: Lime Green 159.

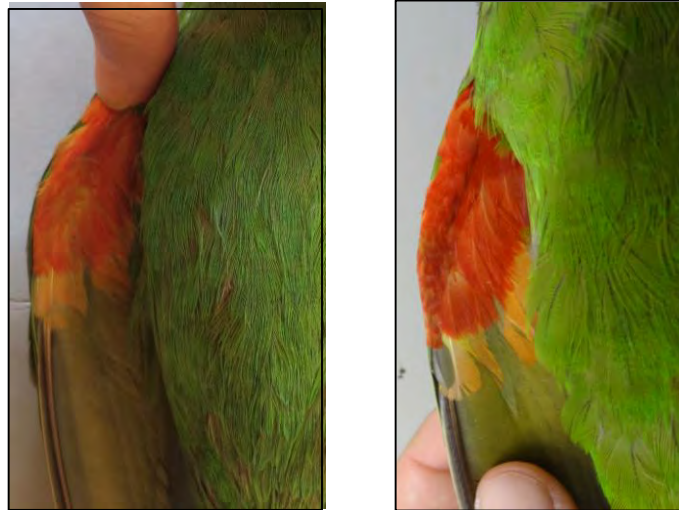


Appendix 7. Mapped character states showing that within the *P. holochlorus* complex (*holochlorus*, *brewsteri*, *brevipes*, *strenuus* and *rubritorquis*) also specimens of *holochlorus* and *strenuus*, besides *brewsteri*, can exhibit bluish tinge on crown; and that all individuals of *brevipes* and *strenuus* present totally green plumage, with the exception of few individuals of *strenuus* that occur sympatrically with *rubritorquis* and exhibit few red feathers on upper throat and throat.

Blue: bluish tinge on crown, red: scattered red feathers on upper throat and throat, green: totally green plumage, yellow: red mixed with yellow upper throat and throat.

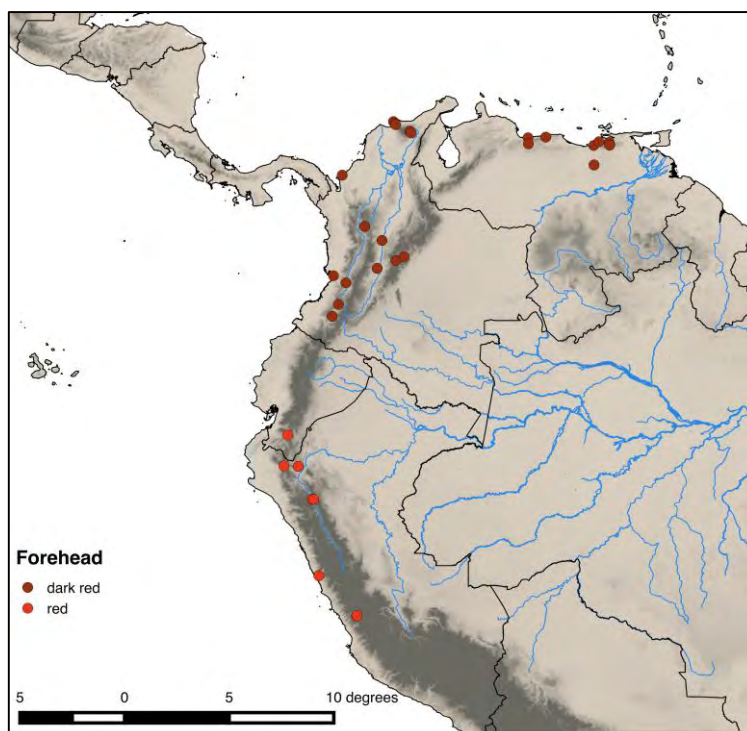


Appendix 8. Photos from left to right of *P. maugei* (MNHN132) and *P. chloropterus* (FMNH40293) showing that the former exhibits red (Scarlet 14) mixed with yellow (Spectrum Yellow 55) lesser and greater underwing-coverts; while the latter presents red (Scarlet 14) lesser underwing-coverts and mainly red (Scarlet 14) greater underwing-coverts with yellow (Spectrum Yellow 55) edges.

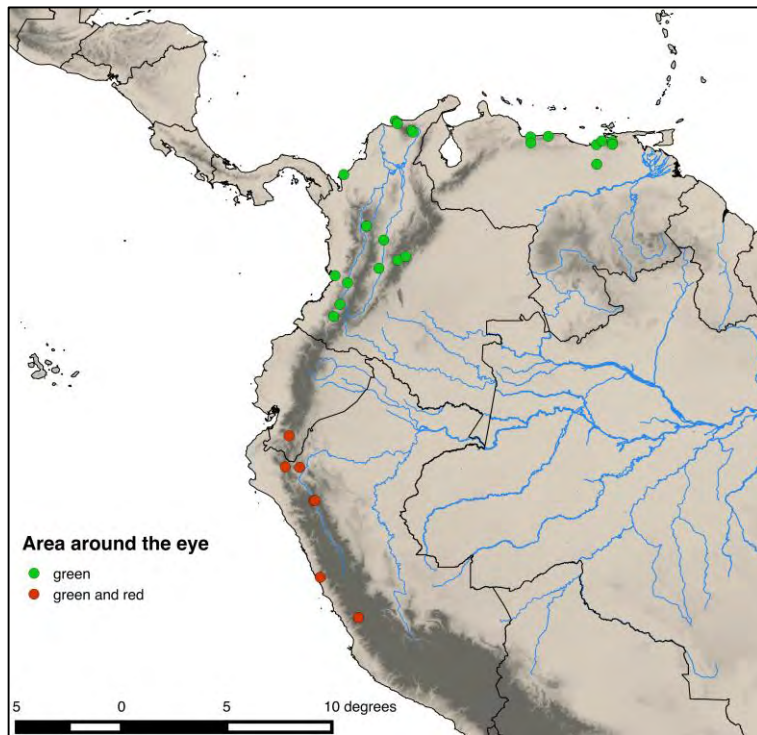


Appendix 9. Mapped characters showing that there are no significant differences in plumage between *A. w. wagleri* and *A. w. transilis*, and between *A. w. frontatus* and *A. w. minor*.

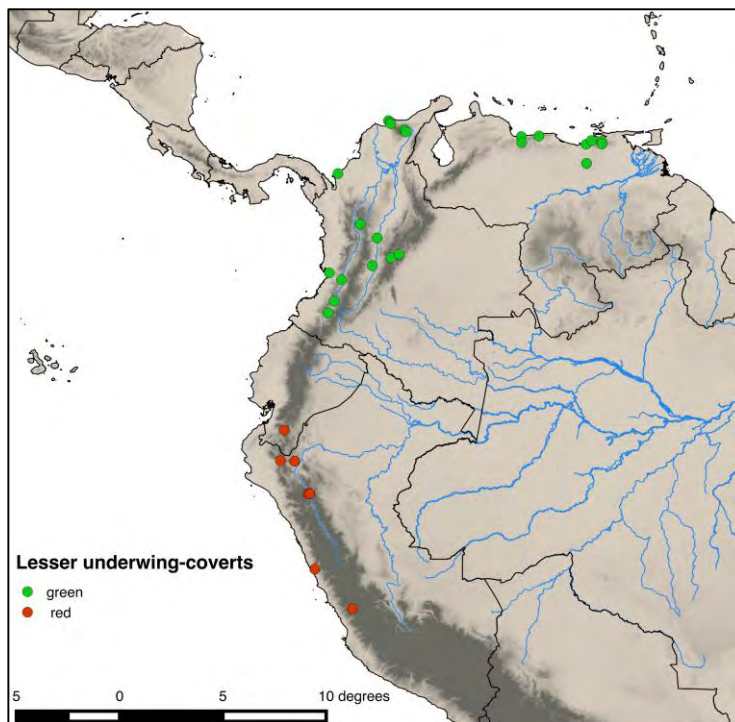
(A) Forehead coloration. Brown: Maroon 31, red: Scarlet 14.



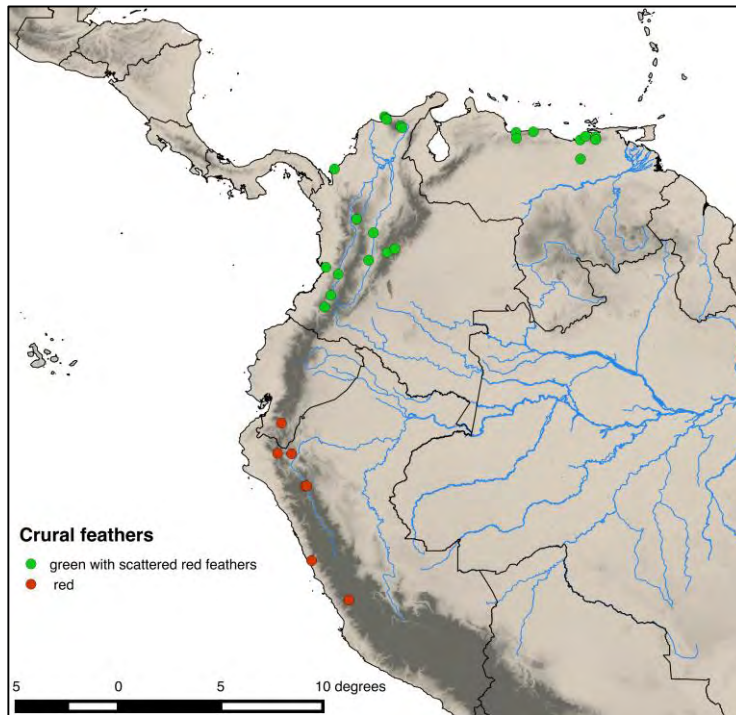
(B) Area around the eye coloration. Green: Parrot Green 260, red: Parrot Green 260 and Scarlet 14.



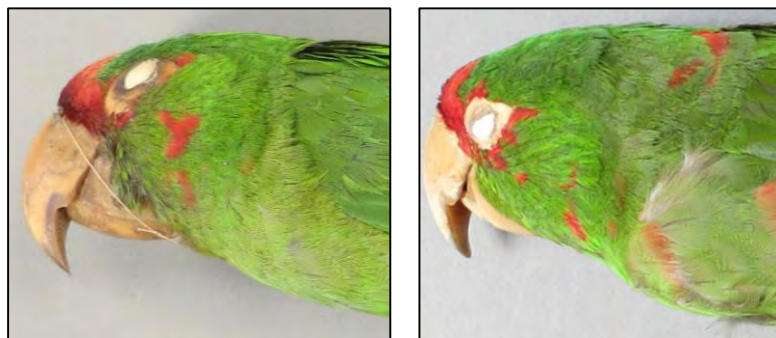
(C) Lesser underwing-coverts coloration. Green: Lime Green 159, red: Scarlet 14.



(D) Crural feathers coloration. Green: Lime Green 159 with scattered Scarlet 14 feathers, red: Scarlet 14.

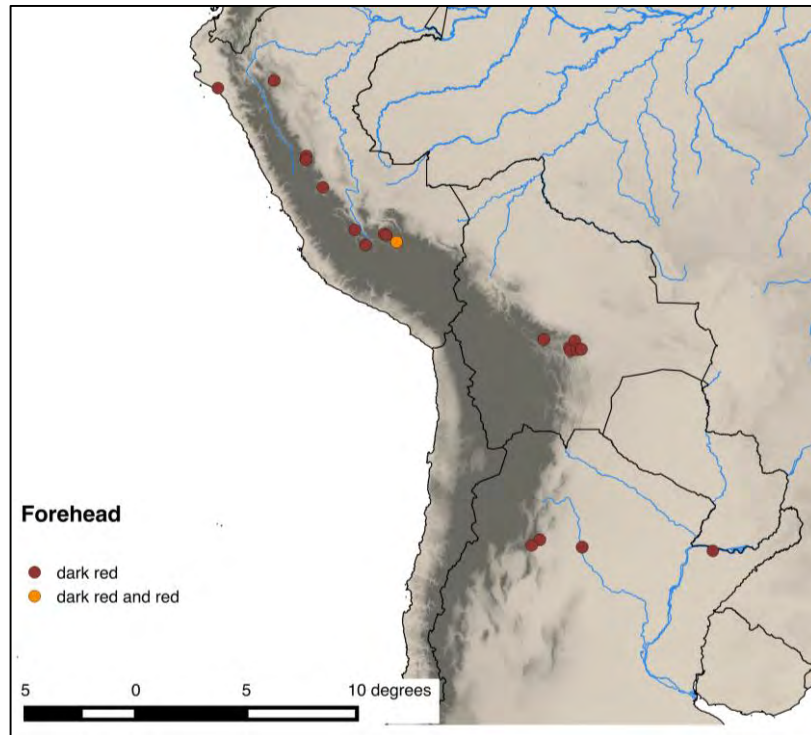


Appendix 10. Photos from left to right of *A. m. chlorogenys* (AMNH235433) and *A. hockingi* (LSUMZ73788), showing that they both present Maroon 31 forehead and Scarlet 14 part of crown; scattered red feathers on area around the eye, cheeks and auriculars.

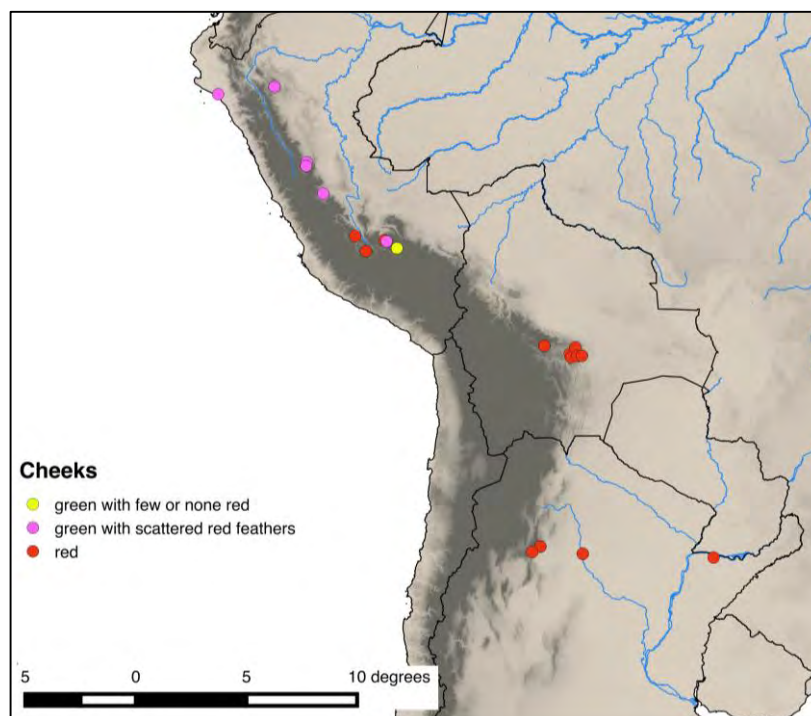


Appendix 11. Mapped characters states supporting the existence of three species within the *P. mitratus* complex: *alticolus*, *chlorogenys* and *mitratus*.

(A) Forehead coloration. Orange: restricted Maroon 31 and Scarlet 14 band (*alticolus*), brown: Scarlet 14 (*chlorogenys*, *hockingi*, *mitratus*, *tucumanus*).



(B) Cheeks coloration. Yellow: Lime Green 159 with few or none Scarlet 14 feathers (*alticolus*), pink: Lime Green 159 with scattered Scarlet 14 feathers (*chlorogenys* and *hockingi*), red: Scarlet 14 (*mitratus* and *tucumanus*).



Capítulo 5

Morphology-based phylogeny supports splitting of the genus *Aratinga* Spix, 1824 (Aves: Psittacidae)

Abstract

The genus *Aratinga* Spix, 1824 traditionally includes 21 species of neotropical parakeets that range from Central to the extreme South of America, characterized by long, pointed tail and mostly green plumage. Several authors have questioned the monophyly of the genus mainly based on results of molecular studies. Silveira *et al.* (2005) and Remsen *et al.* (2013) first suggested a splitting of the genus based on plumage analysis. Particularly, Remsen *et al.* (2013) proposed the separation into four distinct genera: *Aratinga*, *Thectocercus*, *Eupsittula* and *Psittacara*. Nevertheless, no morphological phylogenetic hypotheses have ever been proposed for the genus *Aratinga* and molecular studies have included only some of the species reported in the literature. In order to test the questioned monophyly of the genus, this study proposes, for the first time, a phylogenetic hypothesis for the genus *Aratinga* based on osteological and plumage characters, including all species recognized after the taxonomic revision. Finally, resulting phylogenetic hypotheses based on morphology were compared with molecular studies findings. Osteological characters alone failed to recover the relationships among the four genera proposed after the taxonomic revision, whereas plumage characters resulted in a slightly better resolution, recovering the monophyly of *Eupsittula*. Combining datasets improved resolution, recovering the monophyly of *Thectocercus* and *Eupsittula*, and confirming the close relationship of *C. carolinensis* with the genus *Aratinga*. Overall, as suggested by the taxonomic revision and molecular studies, morphological characters do not support the monophyly of the genus.

Resumo

O gênero *Aratinga* Spix, 1824 tradicionalmente inclui 21 espécies de periquitos neotropicais que ocorrem desde o Centro até o extremo Sul da América, caracterizados por cauda comprida, pontiaguda e plumagem predominantemente verde. Vários autores têm questionado o monofiletismo do gênero primariamente com base nos resultados de estudos moleculares. Silveira *et al.* (2005) e Remsen *et al.* (2013) foram os primeiros a sugerir uma divisão do gênero baseada na análise de plumagem. Particularmente, Remsen *et al.* (2013) propuseram uma separação em quatro gêneros distintos: *Aratinga*, *Thectocercus*, *Eupsittula* e *Psittacara*. No entanto, nunca foram propostas hipóteses filogenéticas morfológicas para o gênero *Aratinga* e estudos moleculares incluíram apenas algumas das espécies reportadas na literatura. A fim de testar o questionado monofiletismo do gênero, este estudo propõe, pela primeira vez, uma hipótese filogenética para o gênero *Aratinga* baseada em caracteres osteológicos e de plumagem, incluindo todas as espécies reconhecidas após a revisão taxonômica. Finalmente, as hipóteses filogenéticas com base na morfologia foram comparadas com os resultados dos estudos moleculares. A análise com base em caracteres unicamente osteológicos não conseguiu recuperar as relações entre os quatro gêneros propostos após a revisão taxonômica, enquanto a análise com caracteres de plumagem resultou em uma resolução um pouco melhor, recuperando o monofiletismo de *Eupsittula*. Por fim, a combinação de conjuntos de dados melhorou a resolução, recuperando o monofiletismo de *Thectocercus* e *Eupsittula* e confirmando a relação próxima de *C. carolinensis* com o gênero *Aratinga*. No geral, tal como sugerido pela revisão taxonômica e por estudos moleculares, os caracteres morfológicos não suportam o monofiletismo do gênero.

Morphology-based phylogeny supports splitting of the genus *Aratinga* Spix, 1824 (Aves: Psittacidae)

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1. INTRODUCTION

Parrots have always caught human attention mainly because of their colorful plumage. The earliest record of humans keeping parrots can be found in the work of Ctesias, a Greek physician who served in the court of Artaxerxes II of Persia around 398 BC (Cameron 2012). Besides plumage, parrots popularity depends on their social nature, particularly, on their capacity to use human words, a trait that has ensured them a distinguished place in mythology, literature and popular culture. Parrots belong to the order Psittaciformes, one of the most species-rich groups of non-passeriform birds with approximately 353 species currently recognized (Rowley 1997; Astuti *et al.* 2006; Schweizer *et al.* 2010) that occur in most tropical and subtropical regions. The relationships within Psittaciformes are far from solved. Based on morphological (Garrod 1874; Beddard 1898; Collar 1997; de Kloet and de Kloet 2005; Wright *et al.* 2008) and molecular data (Ericson *et al.* 2006), several authors recognize two families within Psittaciformes: Cacatuidae and Psittacidae; whereas Joseph *et al.* (2012) using molecular, paleontological and morphological evidence split the order into three superfamilies (Strigopoidea, Cacatuoidea and Psittacoidea), that include six families: Strigopidae, Nestoridae, Cacatuidae, Psittichasidae, Psittacidae and Psittaculidae. Moreover, a reduction to four families (Strigopidae, Cacatuidae, Psittacidae and Psittaculidae) has been recently proposed by Cracraft (2013), Dickinson and Remsen (2013). Regarding the classification of the family Psittacidae, most authors recognize two subfamilies: Psittacinae (typical parrots) and Loriinae (lories and lorikeets) (de Kloet and de Kloet 2005; Astuti *et al.* 2006). Within Psittacinae, nine tribes have been proposed (Forshaw 1989; Collar 1997; Tavares *et al.* 2006): Psittacini (Africa), Arini (Neotropics), Platycerini (Australia, New Zealand and Caledonia), Psittaculini (Australia and Africa), Psittichadini (New Guinea), Ciclopsittacini (Australia and New Guinea), Micropsittini (New Guinea), Strigopini (New Zealand) and Nestorini (New Zealand). On the other hand, Joseph *et al.* (2012) suggested that Psittacidae should include the subfamilies Psittacinae (Old World parrots) and Arinae (Neotropical parrots). Within Arinae, two tribes are proposed: Arini and Androglossini. The tribe Arini includes Neotropical parrots ranging from Mexico to the extreme south of South America (Forshaw 1989) and represents the largest

group within Psittaciformes, with 148 species in 30 genera (out of 353 species of parrots), (Collar 1997; Tavares *et al.* 2006; Schweizer *et al.* 2010).

The genus *Aratinga* Spix, 1824 belongs to the tribe Arini and includes 21 species of medium-sized, pointed-tailed, mostly green parakeets that range throughout the Neotropical region (Kremer 1989; Collar 1997; Juniper and Parr 1998; Silveira *et al.* 2005; Forshaw 2010; Remsen *et al.* 2013), whose ecology is still little known. In 1891 Salvadori placed all species currently included in the genus *Aratinga* in the genus *Conurus*. Ridgway (1916) split the species in four genera: *Aratinga*, *Eupsittula*, *Nandayus*, and *Thectocercus*; using morphological and plumage characters. Cory (1918) followed Ridgway's (1916) classification. Miranda-Ribeiro (1920) based on plumage and bill morphology, placed the species in four genera: *Conurus*, *Nendayus*, *Gymnopsittacus* and *Eupsittacula*. Peters (1937) placed all members of these genera but *Nandayus nenday* into a single genus, *Aratinga*, with no rationale for his treatment. All subsequent classifications (Pinto 1938; Meyer de Schauensee 1970; Forshaw 1989; Sibley and Ahlquist 1990; Arndt 1981, 1995; Collar 1997; Juniper and Parr 1998; Dickinson 2003) followed Peters, except Forshaw (2010), that included *nenday* in *Aratinga*. Silveira *et al.* (2005) first delimited at least three groups (*A. solstitialis*, *A. leucophthalma*, *A. pertinax*) based on plumage analysis within broadly defined *Aratinga* and proposed that it was not a monophyletic genus. Similarly, several molecular studies suggested that *Aratinga* sensu Peters (1937) is polyphyletic (Ribas and Miyaki 2004; Andrioni 2006; Freddi 2012; Kirchman *et al.* 2012; Urantowka *et al.* 2012, 2013). Recently, Remsen *et al.* 2013 proposed partitioning the genus *Aratinga* into four genera (*Aratinga*, *Psittacara*, *Eupsittula* and *Thectocercus*) based on plumage analysis and comparisons with molecular published phylogenies, classification adopted by Dickinson and Remsen (2013). Finally, Ferraroni & Silveira (in prep.) performed a complete taxonomic revision of the genus *Aratinga* sensu Peters (1937) based on morphology and morphometrics, confirming the splitting into four genera (Appendix 1).

Nevertheless, no morphological phylogenetic hypotheses have ever been proposed for the genus *Aratinga* and molecular studies have included only some of the species reported in the literature. In order to test the questioned monophyly of the genus, this study proposes, for the first time, a phylogenetic hypothesis for the genus *Aratinga* sensu Peters (1937) based on osteological and plumage characters, including all species recognized after the taxonomic revision. Finally, resulting phylogenetic hypotheses based on morphology are compared with molecular studies findings.

2. MATERIALS AND METHODS

For this study, a total of 2551 skins (Appendix 2) and 333 skeletons (Appendix 3) from 17 museums and ornithological collections in Europe, North America and South America were examined in the visited collections or analyzed through high-quality photos (Table 1). Particularly, 2090 skins and 252 skeletons belong to the 37 species recognized after the taxonomic revision (Appendix 1), whereas 461 and 81 respectively to the selected outgroups. The criterion adopted for identifying and delimiting taxonomic units was diagnosability. Characters were selected to find fully diagnosable clusters of individuals sharing similar morphology, that after analysis were considered species following the Phylogenetic Species Concept (Nelson and Platnik 1981; Cracraft 1983, 1987, 1989; McKittrick and Zink 1988).

Table 1. List of visited or contacted museums and number of analyzed specimens.

Museum	N° of skins	N° of skeletons
Museu de Zoologia da Universidade de São Paulo (MZUSP), São Paulo, Brazil	912	39
Museu Nacional do Rio de Janeiro (MNRJ), University of Rio de Janeiro, Brazil	3	
Museo Argentino de Ciencias Naturales Bernardino Rivadavia (MACN), Buenos Aires, Argentina	10	
American Museum of Natural History (AMNH), New York, USA	549	70
Smithsonian Institution National Museum of Natural History (USNM), Washington, USA	286	90
Field Museum of Natural History (FMNH), Chicago, USA	359	51
Louisiana Museum of Natural History (LSUMZ), Baton Rouge, USA	179	58
Museum of Comparative Zoology (MCZ), Harvard University, Boston, USA	3	
Academy of Natural Sciences of Philadelphia (ANSP), Philadelphia, USA	3	
Carnegie Museum of Natural History (CMNH), Pittsburgh, USA	15	
Moore Laboratory of Zoology (MLZ), Los Angeles, USA	1	
University of Michigan Museum of Natural History (UMMZ)	1	
Natural History Museum (BMNH), Tring, UK	144	25
Muséum National d'Histoire Naturelle (MNHN), Paris, France	75	
Museum für Naturkunde (ZMB), Berlin, Germany	6	
Zoologische Staatssammlung München (ZSM), Munich, Germany	4	
Senckenberg Museum (SMF), Frankfurt, Germany	1	

2.1 Osteological characters

Skeletons examination was performed comparing specimens within the same taxon and among all selected species, in order to infer intra and interspecific variation. Those specimens that could not be identified at species level being captive bred birds or lacking locality information, 27 out of 333, were excluded from phylogenetic analysis. The nomenclature adopted is based on Baumel *et al.* (1993) and osteological characters were described according to Sereno (2007). Moreover, characters were codified for 28 ingroup taxa (out of the 37 selected in the present study) and 10 outgroups. A matrix including 40 binary characters (Appendix 4) was built in Nexus Data Editor (NDE) 0.5 (Page 2001). Polymorphic characters were codified as “[]”, inapplicable as “-” and missing data as “?”.

2.2 Plumage characters

Plumage characters were based on codification of each part of the body that presented variation in coloration, described according to Sereno (2007) and Forshaw (2010). In addition, pigments responsible for plumage coloration were included in the analysis, since parrots exhibit exclusive endogenously synthesized pigments, such as the psittacofulvins, responsible for yellow to red coloration (McGraw and Nogare 2004, 2005; Taysom *et al.* 2011; Tinbergen *et al.* 2013). The matrix was built in Nexus Data Editor (NDE) 0.5 (Page 2001) and included 45 both binary and multistate characters, codified for all 37 taxa included in the present study (Appendix 4). As in the osteological matrix, polymorphic characters were codified as “[]”, inapplicable as “-” and missing data as “?”.

2.3 Phylogenetic analysis

The phylogenetic analysis was conducted using parsimony (Hennig 1966; Kitching *et al.* 1998) in TNT (Tree analysis using New Technology) 1.1 (Goloboff *et al.* 2008) and Winclada 1.100.008 (Nixon 1999-2002), with unordered and equally weighted characters. Analyses were run first with separate matrices and second combining osteological and plumage datasets. Characters polarization was *a posteriori* and included 10 outgroups, since the inclusion of multiple taxa within the sister group seems to produce more consistent results (Nixon and Carpenter 1993; A-Rong *et al.* 2010). Nevertheless, since TNT and Winclada allow the selection of only one outgroup per time, several analyses were run rooting the resulting cladograms with each of the outgroup taxa. Outgroup selection was based on those taxa that resulted to be closely related to *Aratinga* sensu

Peters (1937) in previous molecular studies (Ribas and Miyaki 2004; Freddi 2012; Kirchman *et al.* 2012; Urantowka *et al.* 2012, 2013) and included *Ara ararauna*, *Guarouba guarouba*, *Diopsittaca nobilis*, *Orthopsittaca manilata*, *Leptosittaca branickii*, *Primolius maracana*, *Ognorhynchus icterotis*, *Cianopsitta spixii*, *Pyrrhura frontalis* and the extinct *Conuropsis carolinensis*.

All performed analyses included an heuristic search (traditional search in TNT) with 0 random seed, 1000 replicates of Wagner trees (using random addition sequence), followed by tree bisection reconnection (TBR) branch swapping, keeping up to 1000 trees per replication. Zero-length branches were collapsed if they lacked support under any of the most parsimonious reconstructions. The choice of an algorithm that is not guaranteed to find the most parsimonious solution is due to the number of terminal taxa being more than 30 and the chance of several characters being homoplastic (Kitching *et al.* 1998). However, opting for a random addition sequence and a TBR branch swapping, we improve the possibilities to reach a global optimum, since several rearrangements of the obtained cladogram are conducted to find a shorter topology.

A strict consensus tree was calculated for each performed analysis and indices (consistency, retention, homoplasy and rescaled consistency) were calculated for each most parsimonious cladogram obtained and each single character, using the STATS.run and WSTATS.run scripts, modified in order to calculate also homoplasy and rescaled consistency indices. In case of ambiguous optimization, when alternative reconstructions are equally costly, TNT does not distinguish between different algorithms (ACCTRAN or DELTRAN), but it displays all possible reconstructions. Therefore, Winclada was used to map character states on the strict consensus tree, opting for an accelerated optimization (ACCTRAN), following de Pinna (1991), who suggested the superiority of this algorithm in tracing character evolution, since it maintains our original conjecture that the character is a synapomorphy, favoring the acquisition and subsequent reversal of a character. Moreover, in order to estimate group support, we performed a standard (sample with replacement) bootstrap analysis with 10000 replicates, since bootstrap provides information about the whole sampling distribution (Kitching *et al.* 1998). Results were output with frequency difference GC (Group present/Contradicted), where the support is measured as the difference in frequency between the group and its most frequent contradictory group. This method can produce better evaluations of the support for all groups, particularly for those with low support (Goloboff *et al.* 2003). Finally, final cladograms were opened in TreeView 1.6.6 (Page 2001) and modified in Photoshop CS6.

3. RESULTS AND DISCUSSION

The description and codification of the 85 characters used to infer the phylogeny of the terminal taxa recognized after the taxonomic revision can be found in the Appendix 5. In this section results of the performed phylogenetic analyses will be discussed and compared with molecular studies findings. The term *Aratinga*, except when specified, refers to the genus recognized after the taxonomic revision. First were run analyses with the osteological dataset, second with the plumage matrix and third with combined datasets. The discussion of ambiguous characters is based on the strict consensus tree obtained in the analysis with combined datasets (Appendix 8).

3.1 Analyses with osteological dataset

Several analyses were performed with the osteological characters, treated as unordered and equally weighted. First, 10 analyses were run including all outgroup taxa (10), 28 ingroup taxa and all osteological characters (40), rooting the obtained cladograms with each single outgroup taxon. The analysis with the best support, where the best score was hit 152 times out of 1000, reported 151 most parsimonious trees (L=215) with *D. nobilis* as selected outgroup, whose index values (CI and RI) can be found in Table 2. The strict consensus tree (L=328, CI=0.122, RI=0.252, RCI=0.031, HI=0.878) is illustrated in Figure 1 and the consistency and retention indices for each character are reported in Table 3. The use of exclusively osteological characters failed to resolve the relationships within the ingroup, except for the proposed genus *Thectocercus* (*T. acuticaudatus* + *T. haemorrhous*) that received a bootstrap support of 25. Taxa belonging to the genus *Aratinga* resulted in a polyphyletic group including *A. ararauna*, *C. spixii*, *P. maracana* and *O. icterotis*, where *A. jandaya* is sister group of (*A. solstitialis* + *A. auricapillus*). The clade with highest bootstrap support (54) was (*P. wagleri* + *P. frontatus*). Nevertheless, relationships among representatives of the genera *Psittacara* and *Eupsittula* remained unresolved. Only two species of *Eupsittula* (*E. chrysophrys* + *E. ocularis*) were grouped together and received bootstrap support of 17. Overall, the monophyly of *Aratinga* sensu Peters (1937) was not supported, as already suggested by molecular studies. For instance, mitochondrial data supported the monophyly of *Aratinga* with *A. weddellii*, *A. nenday* and *A. solstitialis* as sister groups of (*A. jandaya* + *A. auricapillus*), separated from *Eupsittula* and *Psittacara* (Ribas and Miyaki 2004). Similarly, Freddi (2012) using both mitochondrial and nuclear genes, recovered the monophyly of *Aratinga* and Kirchman *et al.* (2012) with mitochondrial data found support for *C. carolinensis* being the sister group of (*A. nenday* (*A. auricapillus* + *A. solstitialis*)). Moreover, Urantowka *et al.* (2013) using

mitochondrial genes found that *A. weddellii*, *A. nenday* and *A. jandaya* are sister groups of (*A. solstitialis* + *A. auricapillus*).

Further analyses were performed reducing the number of ingroup and outgroup taxa respectively, but resolution did not improved much. The analyses with better support always included *D. nobilis* as selected outgroup. Particularly, the analysis with 4 ingroup taxa (*A. solstitialis*, *E. canicularis*, *P. leucophthalmus* and *T. acuticaudatus*) and 10 outgroups reported 4 most parsimonious cladograms (L=109) and the best score was hit 1000 times out 1000. Nevertheless, the strict consensus tree was poorly resolved (L=113, CI=0.345, RI=0.393, RCI=0.136, HI=0.655). Similarly, the analysis including 28 ingroups and one single outgroup (*D. nobilis*) resulted in 72 most parsimonious cladograms (L=147) and a strict consensus with poor support (CI=0.231, RI=0.504, RCI=0.116, HI=0.769), where the best score was hit 616 times out of 1000.

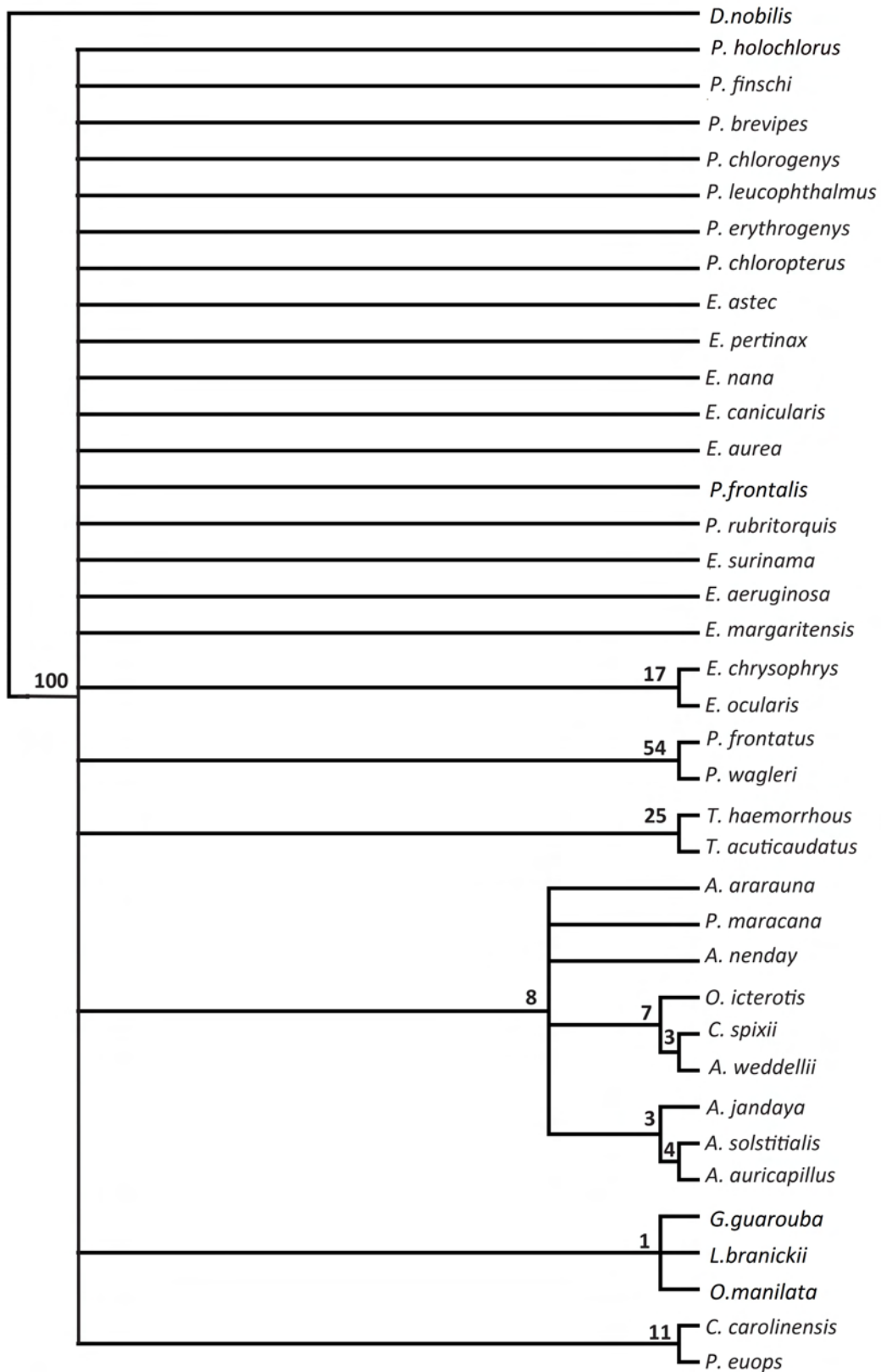


Figure 1. Strict consensus obtained with osteological dataset (40 characters, 28 ingroup and 10 outgroup taxa) with Bootstrap support above the nodes.

3.2 Analyses with plumage dataset

Initially, 10 analyses were performed including all plumage characters (45), all ingroup (37) and outgroup (10) taxa, rooting the obtained cladograms with each single outgroup. The analysis with the best support, where the best score was hit 984 times out of 1000, was the one with *A. ararauna* as selected outgroup that reported 618 most parsimonious trees (L=308) (Table 2). The strict consensus (L=512, CI=0.30, RI=0.43, RCI=0.129, HI=0.70) can be found in Figure 2 and indices value (consistency and retention) for each character in Table 3. Species of *Thectocercus* and *Psittacara* resulted in a polytomy. *A. jandaya*, *A. maculata* and *A. solstitialis* were grouped with *C. carolinensis* and *G. guarouba* in a clade with 29 bootstrap support, whereas *A. weddellii*, *A. auricapillus* and *A. nenday* resulted in a polytomy. The genus *Eupsittula* resulted in a monophyletic group with 38 bootstrap support and poor resolution among the taxa. In fact, only the relationships (*E. ocularis* + *E. paraensis*) and (*E. pertinax* + *E. xanthogenia*) were recovered with 37 and 79 bootstrap support respectively. Molecular studies including several species of *Aratinga* sensu Peters (1937), such as Freddi (2012) also suggested the monophyly of *Eupsittula*, where *E. canicularis* is sister group of (*E. nana* + *E. aurea*) and *E. cactorum* is more closely related to *E. pertinax*. Similarly, Kirchman *et al.* (2012) found that *E. pertinax* is sister group of (*E. aurea* + *E. nana*). Finally, Urantowka *et al.* (2013) proposed *E. pertinax* as the sister group of *E. canicularis* (*E. aurea* + *E. nana*).

Secondly, in order to better understand the relationship of *C. carolinensis* with the ingroup, since Kirchman *et al.* (2012) suggested it to be the sister group of (*A. nenday* (*A. auricapillus* + *A. solstitialis*)), an analysis with all plumage characters (45), all ingroup taxa (37) and only 2 outgroups (*D. nobilis* and *C. carolinensis*) was performed. The analysis reported 88 most parsimonious trees (L=225) and the best score was hit 715 times out of 1000. The strict consensus tree (L=269, CI=0.480, RI=0.718, RCI=0.344, HI=0.520) with *D. nobilis* as selected outgroup presented a better resolution than analysis including all outgroup taxa (Appendix 6). Particularly, *C. carolinensis* resulted to be sister group of (*A. jandaya* (*A. maculata* + *A. solstitialis*)), confirming its close relationship with the genus *Aratinga*. Moreover, *Eupsittula* resulted monophyletic and its resolution slightly improved, suggesting *E. arubensis* as sister group of (*E. tortugensis* (*E. surinama* (*E. pertinax* + *E. xantogenia*))). On the other hand, *T. acuticaudatus* and *T. haemorrhous* appeared as sister groups of *Psittacara*, a monophyletic group with no resolution among the taxa.

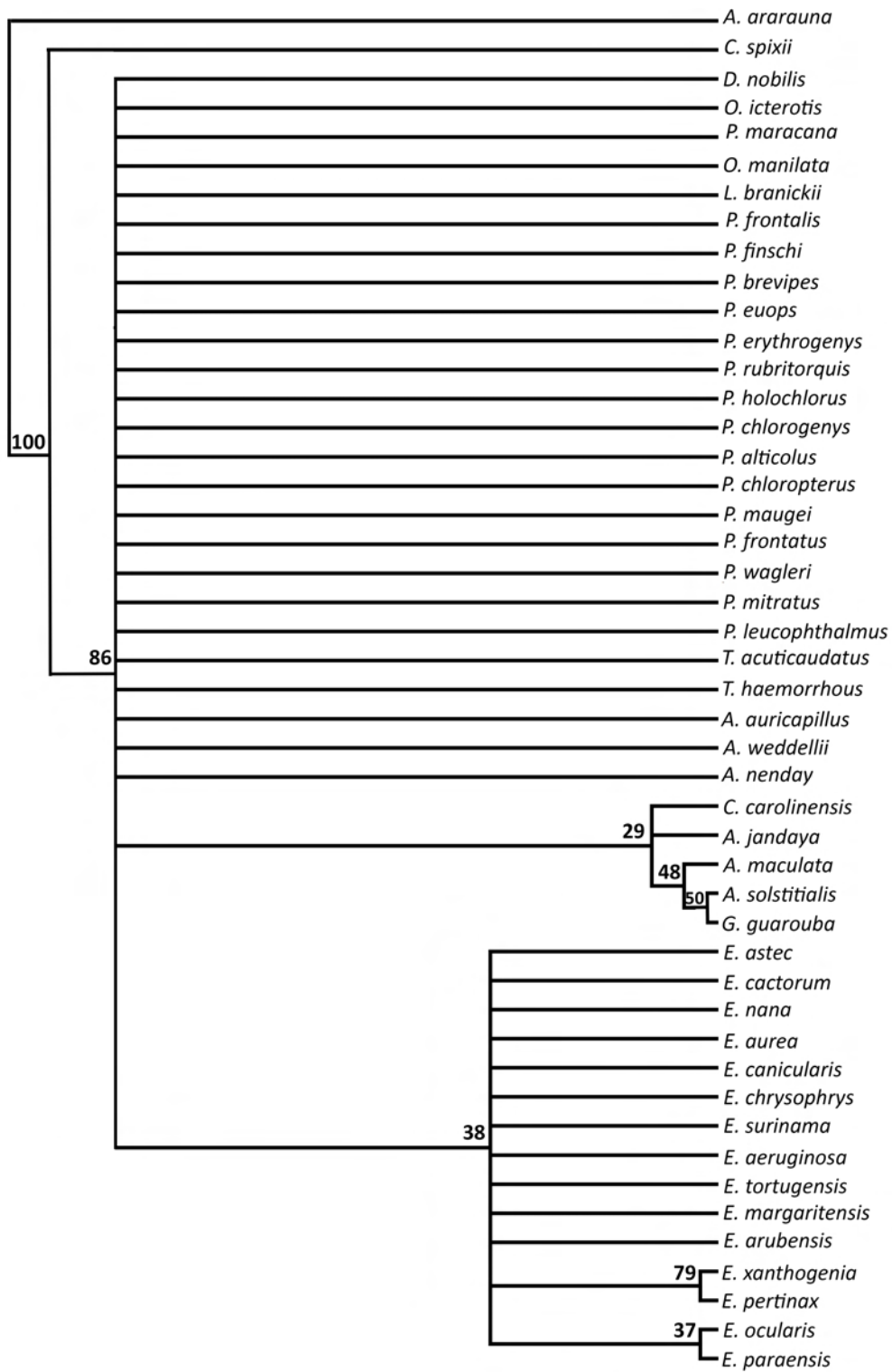


Figure 2. Strict consensus obtained with plumage dataset (45 characters, 37 ingroup and 10 outgroup taxa) with Bootstrap support above the nodes.

3.3 Analyses with combined datasets

The analysis with the combined dataset was first performed with all characters (85), all ingroup taxa (37) and all outgroups (10), rooting the obtained cladograms with each single outgroup. All analyses reported 60 most parsimonious trees (L=576) (Table 2). However, when rooting the ingroup with *D. nobilis*, the best score was hit 605 times out of 1000 and the strict consensus tree (L=606, CI=0.32, RI=0.59, RCI=0.188, HI=0.68) showed better resolution (Figure 3). Particularly, *T. acuticaudatus* and *T. haemorrhous* were grouped together with 53 bootstrap support, but included in a broader monophyletic group including all *Psittacara*. Within *Psittacara*, as in the strict consensus based on osteological characters, *P. wagleri* and *P. frontatus* resulted to be more closely related and received 67 bootstrap support. *P. brevipes* appeared as the sister group of (*P. chloropterus* + *P. maugeli*), whereas the other taxa resulted in a polytomy. Resolution within *Aratinga* improved, recovering a monophyletic group formed by (*A. nenday* (*A. auricapillus* (*C. carolinensis* (*A. jandaya* (*A. solstitialis* + *A. maculata*))))), whereas *A. weddellii* resulted as sister group of (*P. maracana* (*C. spixii* + *A. ararauna*)). *Eupsittula* formed a monophyletic group, where (*E. astec* + *E. nana*) is sister group of all inclusive taxa. Moreover, in addition to the clades (*E. ocularis* + *E. paraensis*) and (*E. pertinax* + *E. xanthogenia*) recovered in the strict consensus based on plumage characters, also the relationship (*E. canicularis* + *E. aurea*) was proposed.

Further analyses were carried out reducing the number of outgroup taxa to find out if resolution would improve. The analysis with only 2 outgroups (*D. nobilis* and *C. carolinensis*), where the best score was hit 820 times out of 1000 and *D. nobilis* was the selected outgroup, reported 48 most parsimonious trees (L=407) and a strict consensus tree with higher support (L=442, CI=0.380, RI=0.641, RCI=0.243, HI=0.62) and improved resolution. In fact, the monophyly of *Thectocercus*, *Psittacara*, *Aratinga* and *Eupsittula* was recovered and the inclusion of *C. carolinensis* within *Aratinga* confirmed (Appendix 7).

Overall, combining datasets improved resolution and confirmed that the genus *Aratinga* sensu Peters (1937) is not monophyletic. In addition, including all taxa recognized after the taxonomic revision helped to understand the relationships within the four genera proposed. For instance, molecular studies included only some of the species of *Aratinga*, suggesting *A. nenday* and *A. weddellii* as basal to (*A. solstitialis* (*A. jandaya* + *A. auricapillus*)) (Ribas and Miyaki 2004); *C. carolinensis* as the sister group of (*A. nenday* (*A. auricapillus* + *A. solstitialis*)) (Kirchman *et al.* 2012) or *A. nenday* and *A. weddellii* as basal to (*A. jandaya* (*A. auricapillus* + *A. solstitialis*)) (Urontowka 2013). Our phylogenetic hypothesis confirmed that *C. carolinensis* is included in

Aratinga, as suggested by Kirchman *et al.* (2012), however, based on osteological and plumage characters, it is more closely related to (*A. jandaya* (*A. solstitialis* + *A. maculata*)) than is to *A. nenday* and *A. auricapillus*. In fact, *C. carolinensis* share with clade 22 the presence of black tarsus and psittacofulvin pigments responsible for crown, cheeks, auriculars, upper throat and throat coloration. Moreover, clade 23 is supported by the presence of green and yellow folded secondaries; green with yellow, dark blue and black edged secondaries.

Within *Eupsittula*, only the relationships (*E. aurea* + *E. cactorum*) (Ribas and Miyaki 2004); ((*E. cactorum* + *E. pertinax*) (*E. canicularis* (*E. nana* + *E. aurea*))) (Freddi 2012); *E. pertinax* (*E. aurea* + *E. nana*) (Kirchman *et al.* 2012); *E. pertinax* (*E. canicularis* (*E. aurea* + *E. nana*)) (Urantowka *et al.* 2013) were recovered in molecular studies. Our analysis suggested that *E. astec* is more closely related to *E. nana*, in fact both species occur in central America (Mexico and Jamaica respectively) and present mainly green upperparts and brownish underparts. Furthermore, the close relationship between *E. canicularis* and *E. aurea* may be explained by their similar plumage. In fact, they only differ in bill and periophthalmic ring coloration. The clade 28 was supported by the presence of orange and blue crown, and brownish tinged with blue cheeks. Within the *Eupsittula* occurring in the north part of South America two inclusive groups were recovered, one including inland species (with the exception of *E. margaritensis* that occurs also on Margarita Island): *E. aeruginosa*, *E. margaritensis*, *E. chrysophrys*, *E. ocularis* and *E. paraensis* (clade 30); and one group of species endemic of islands: *E. arubensis*, *E. tortugensis*, *E. surinama*, *E. pertinax* and *E. xanthogenia* (clade 32).

When *Thectocercus* has been included in molecular phylogenies, only the nominotypic form was examined, that usually resulted to be more closely related to *D. nobilis* (Freddi 2012; Urantowka *et al.* 2012, 2013). In our combined analysis the clade 4 (*T. acuticaudatus* + *T. haemorrhous*) was supported by the presence of grayish-olive and ferruginous undertail. However, it resulted grouped within the *Psittacara*, probably by the fact that both genera exhibit mostly green plumage.

Finally, molecular studies including several species of *Psittacara* suggest a basal position of *P. leucophthalmus* to the more inclusive taxa (Freddi 2012; Kirchman *et al.* 2012; Urantowka *et al.* 2012, 2013). Unfortunately, we obtained a poor resolution within *Psittacara*, since they all present mainly green plumage with red feathers throughout the body. Nevertheless, clade 6 (*P. brevipes* (*P. chloropterus* + *P. maugeri*)) includes species that occur on islands, and the clade 7 was

supported by the presence of red and yellow greater underwing-coverts, suggesting a close relationship between *P. chloropterus* and the extinct *P. maugei*.

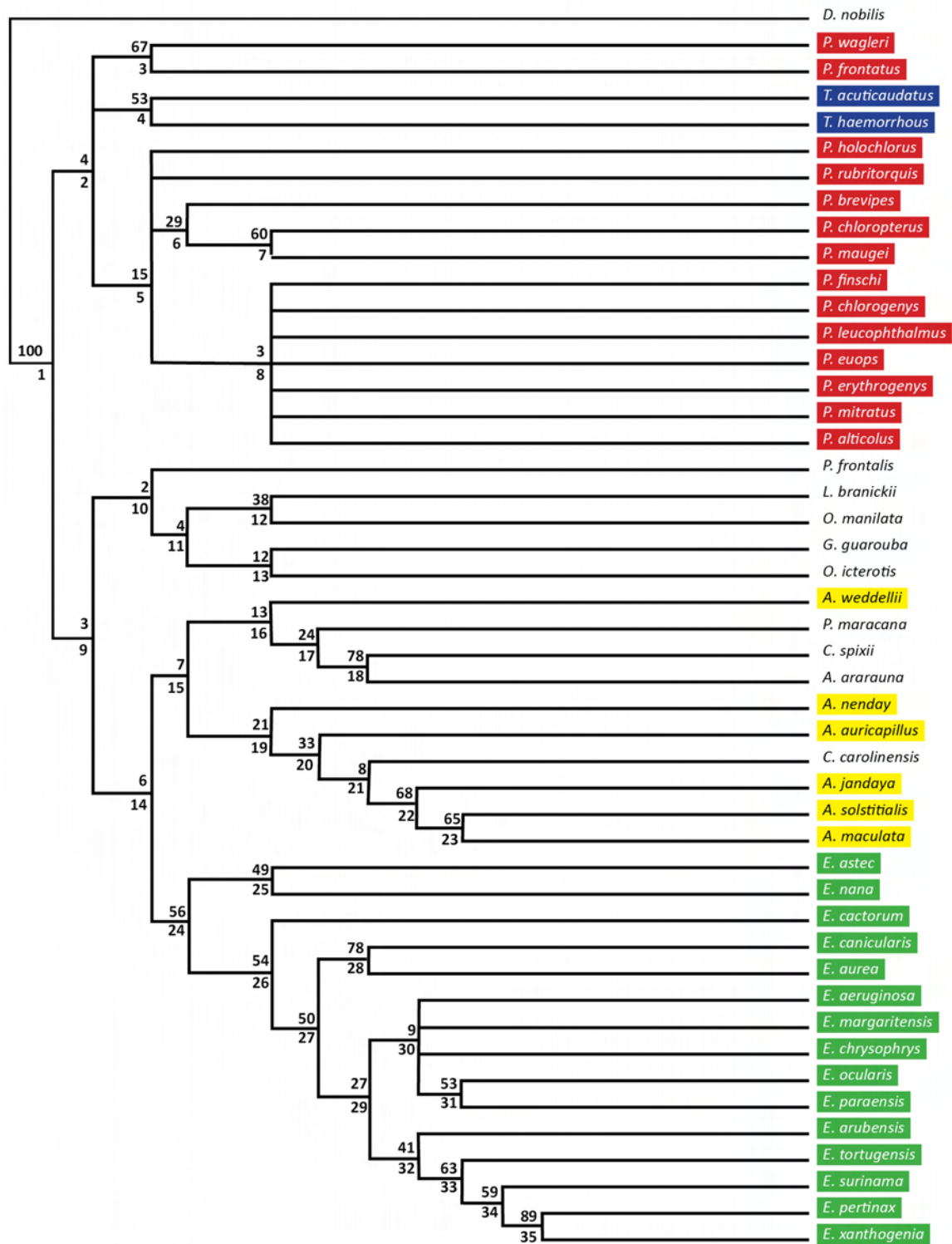


Figure 3. Strict consensus obtained combining datasets (85 characters, 37 ingroup and 10 outgroup taxa) with Bootstrap support (above nodes) and clade number (below nodes).

Unambiguous synapomorphies supporting clades and autapomorphies are reported below.

1) 36(0→1). **4)** 85(1→2). **7)** 69(0→4). **8)** 49(0→5), 50(0→2). **9)** 18(1→0), 70(0→1), 83(0→1). **10)** 85(1→4). **14)** 81(0→2), 82(0→2), 84(0→2). **15)** 28(1→0), 85(1→0). **16)** 51(0→2), 63(0→2). **17)** 75(0→1), 84(2→4). **18)** 65(0→2), 67(0→3), 71(0→2), 72(0→1), 73(0→1), 76(0→3), 77(0→4), 81(1→4), 82(1→4), 83(0→2). **20)** 68(1→3), 69(1→3), 77(0→2). **22)** 80(0→4). **23)** 76(0→1), 82(2→6). **24)** 60(0→3), 63(0→3), 81(2→3), 82(2→3), 84(2→3). **26)** 54(0→4), 74(3→1), 80(0→1). **27)** 56(0→4), 57(0→4). **28)** 50(3→5), 54(4→6). **31)** 46(0→2). **32)** 53(2→4). **33)** 59(3→4). **35)** 50(3→6). *T. acuticaudatus* 78(0→4), 79(0→4). *P. rubritorquis* 60(0→6), 63(0→6). *P. maugei* 68(4→5). *P. leucophthalmus* 70(0→5). *P. erythrogegens* 51(0→4), 57(0→2). *P. frontalis* 53(0→6), 59(0→5), 67(0→4). *O. manilata* 45(0→3), 53(0→5). *G. guarouba* 75(0→3). *A. weddellii* 73(0→2). *A. ararauna* 62(2→5), 83(2→3). *A. nenday* 49(1→6), 50(4→7), 54(0→5), 57(0→5), 60(0→5), 63(0→5). *C. carolinensis* 81(2→5), 82(2→5). *A. maculata* 67(1→2), 71(3→4), 72(2→3), 77(1→3).

Table 2. Consistency and retention indices for each of the most parsimonious cladograms obtained in the analyses with osteological (A), plumage (B) and combined datasets (C).

Analysis	Index	MPT	1	2	3	4	5	6	7	8	9	10	
A	CI	0	0.186	0.186	0.186	0.186	0.186	0.186	0.186	0.186	0.186	0.186	
		10	0.186	0.186	0.186	0.186	0.186	0.186	0.186	0.186	0.186	0.186	
		20	0.186	0.186	0.186	0.186	0.186	0.186	0.186	0.186	0.186	0.186	
		30	0.186	0.186	0.186	0.186	0.186	0.186	0.186	0.186	0.186	0.186	
		40	0.186	0.186	0.186	0.186	0.186	0.186	0.185	0.186	0.186	0.186	
		50	0.186	0.182	0.186	0.185	0.186	0.186	0.186	0.186	0.186	0.186	
		60	0.186	0.185	0.186	0.183	0.186	0.186	0.186	0.186	0.185	0.186	
		70	0.186	0.185	0.186	0.186	0.186	0.186	0.185	0.183	0.186	0.186	
		80	0.186	0.186	0.186	0.185	0.186	0.186	0.185	0.184	0.185	0.186	
		90	0.186	0.185	0.185	0.185	0.186	0.186	0.186	0.186	0.185	0.186	
		100	0.186	0.185	0.186	0.186	0.186	0.186	0.185	0.186	0.186	0.186	
		110	0.186	0.186	0.186	0.185	0.185	0.185	0.185	0.186	0.186	0.186	
		120	0.186	0.186	0.186	0.186	0.186	0.186	0.186	0.186	0.185	0.185	
		130	0.185	0.186	0.186	0.186	0.186	0.186	0.186	0.186	0.186	0.186	
		140	0.185	0.186	0.186	0.186	0.186	0.186	0.186	0.185	0.186	0.186	
		150	0.186										
		RI	0	0.545	0.545	0.545	0.545	0.545	0.545	0.545	0.545	0.545	0.545
			10	0.545	0.545	0.545	0.545	0.545	0.545	0.545	0.545	0.545	0.545
			20	0.545	0.545	0.545	0.545	0.545	0.545	0.545	0.545	0.545	0.545
			30	0.545	0.545	0.545	0.545	0.545	0.545	0.545	0.545	0.545	0.545
		40	0.545	0.545	0.545	0.545	0.545	0.543	0.545	0.545	0.545	0.545	
		50	0.545	0.532	0.545	0.543	0.545	0.545	0.545	0.545	0.545	0.545	

Analysis	Index	MPT	1	2	3	4	5	6	7	8	9	10
A	RI	60	0.545	0.543	0.545	0.535	0.545	0.545	0.545	0.543	0.545	0.545
		70	0.545	0.543	0.545	0.545	0.545	0.543	0.535	0.545	0.545	0.543
		80	0.543	0.545	0.545	0.543	0.545	0.543	0.540	0.543	0.545	0.545
		90	0.545	0.545	0.545	0.543	0.545	0.545	0.545	0.543	0.545	0.545
		100	0.545	0.543	0.545	0.545	0.545	0.543	0.545	0.545	0.545	0.545
		110	0.545	0.545	0.545	0.543	0.543	0.543	0.545	0.545	0.545	0.545
		120	0.545	0.545	0.545	0.545	0.545	0.545	0.545	0.543	0.543	0.543
		130	0.543	0.545	0.545	0.545	0.545	0.545	0.545	0.545	0.545	0.543
		140	0.543	0.545	0.545	0.545	0.545	0.545	0.545	0.543	0.545	0.545
		150	0.545									
B	CI	1-618	0.506									
	RI	1-618	0.756									
C	CI	1-60	0.34									
	RI	1-60	0.62									

Table 3. Character indices (ci, ri) for the strict consensus obtained in the analyses with osteological (A), plumage (B) and combined datasets (C).

Character/Analysis	A		B		C	
	ci	ri	ci	ri	ci	ri
1	0.143	0.143	-	-	0.12	0
2	0.083	0.154	-	-	0.12	0.46
3	0.143	0.250	-	-	0.16	0.37
4	0.250	0	-	-	0.25	0
5	0.143	0.250	-	-	0.12	0.12
6	0.167	0.167	-	-	0.25	0.5
7	0.077	0.077	-	-	0.16	0.61
8	0.125	0.533	-	-	0.16	0.66
9	0.125	0.417	-	-	0.14	0.50
10	0.143	0.143	-	-	0.14	0.14
11	0.1	0.182	-	-	0.16	0.54
12	0.071	0.133	-	-	0.12	0.53
13	0.083	0.267	-	-	0.20	0.73
14	0.111	0.2	-	-	0.14	0.40
15	0.167	0.444	-	-	0.12	0.22
16	0.071	0.133	-	-	0.9	0.33

Character/Analysis	A		B		C	
	ci	ri	ci	ri	ci	ri
17	0.2	0.2	-	-	0.20	0.20
18	0.1	0.4	-	-	0.25	0.80
19	0.111	0.2	-	-	0.10	0.10
20	0.167	0	-	-	0.25	0.40
21	0.091	0.091	-	-	0.20	0.63
22	0.5	0.875	-	-	0.25	0.62
23	0.1	0.357	-	-	0.8	0.21
24	0.091	0.286	-	-	0.11	0.42
25	0.071	0.133	-	-	0.12	0.53
26	0.1	0.1	-	-	0.14	0.40
27	0.167	0.5	-	-	0.25	0.70
28	0.250	0.250	-	-	0.33	0.50
29	0.083	0.267	-	-	0.14	0.60
30	0.167	0.375	-	-	0.20	0.50
31	0.091	0.286	-	-	0.11	0.42
32	0.5	0.5	-	-	0.33	0
33	0.091	0.231	-	-	0.12	0.46
34	0.091	0.308	-	-	0.10	0.30
35	0.333	0	-	-	0.33	0
36	0.5	0	-	-	0.50	0
37	0.077	0.077	-	-	0.9	0.23
38	0.2	0.2	-	-	0.20	0.20
39	0.111	0.2	-	-	0.10	0.10
40	0.5	0	-	-	0.5	0
41	-	-	0.118	0.286	0.4	0.85
42	-	-	0.059	0.2	0.20	0.77
43	-	-	0.5	0	0.50	0
44	-	-	0.091	0.444	0.25	0.83
45	-	-	0.25	0.1	0.33	0.50
46	-	-	0.167	0.167	0.18	0.25
47	-	-	0.105	0.105	0.16	0.47
48	-	-	0.125	0	0.20	0.42
49	-	-	0.208	0.269	0.31	0.57
50	-	-	0.304	0.333	0.46	0.66
51	-	-	0.667	0.667	0.57	0.50

Character/Analysis	A		B		C	
	ci	ri	ci	ri	ci	ri
52	-	-	0.5	0	0.50	0
53	-	-	0.316	0.435	0.46	0.69
54	-	-	0.375	0.5	0.60	0.80
55	-	-	0.167	0	0.25	0.40
56	-	-	0.2	0.304	0.40	0.73
57	-	-	0.333	0.524	0.62	0.85
58	-	-	0.167	0	0.25	0.40
59	-	-	0.385	0.652	0.45	0.73
60	-	-	0.455	0.714	0.62	0.85
61	-	-	0.125	0	0.25	0.57
62	-	-	0.455	0.714	0.45	0.71
63	-	-	0.556	0.789	0.62	0.84
64	-	-	0.2	0	0.20	0
65	-	-	1	1	0.66	0.66
66	-	-	0.333	0	0.33	0
67	-	-	1	1	0.80	0.50
68	-	-	0.294	0.2	0.35	0.40
69	-	-	0.235	0.133	0.36	0.53
70	-	-	0.263	0.417	0.35	0.62
71	-	-	0.444	0.286	0.40	0.14
72	-	-	1	1	0.75	0.50
73	-	-	1	1	1	1
74	-	-	0.267	0.5	0.40	0.72
75	-	-	0.75	0.5	0.75	0.50
76	-	-	0.75	0.667	0.75	0.66
77	-	-	0.8	0.667	0.66	0.33
78	-	-	0.263	0.3	0.41	0.65
79	-	-	0.263	0.3	0.41	0.65
80	-	-	0.313	0.476	0.55	0.80
81	-	-	0.357	0.640	0.62	0.88
82	-	-	0.4	0.625	0.66	0.87
83	-	-	0.3	0.667	0.50	0.85
84	-	-	0.444	0.773	0.80	0.95
85	-	-	0.286	0.167	0.57	0.75

4. CONCLUSIONS

One great advantage of morphological methods is their applicability to preserved specimens in museums (Vogt *et al.* 2010), particularly for those species that are rare, extinct (such as *P. mauei* and *C. carolinensis*) or represented only by type series, that commonly are hundreds of years old (Hillis 1987; Wilson 1992; Donoghue and Alverson 2000). Moreover, morphological characters can be applied to large samples of each species from throughout its geographical range, allowing a better understanding of intra and interspecific variation. In the present study was proposed the first phylogenetic hypothesis for the genus *Aratinga* sensu Peters (1937) based on osteological and plumage characters. Particularly, osteological characters alone failed to recover the relationships among the four genera proposed after the taxonomic revision, probably due to the low interspecific variation and presence of polymorphic characters. In fact, osteological characters produce better resolution in analyses at family or above level (Omland and Lanyon 2000). On the other hand, plumage characters resulted in a slightly better resolution, recovering the monophyly of *Eupsittula*. Combining datasets improved resolution, besides the large number of terminal taxa, recovering the monophyly of *Thectocercus* and *Eupsittula*, and confirming the close relationship of *C. carolinensis* with the genus *Aratinga*. Overall, as suggested by the taxonomic revision and molecular studies, morphological characters do not support the monophyly of the genus *Aratinga* sensu Peters (1937) and highlight a great interspecific variation in plumage that resulted in several homoplastic characters. The next step will include combining both morphological and molecular data for all terminal taxa, since their combination often produces analyses than are more useful than separate studies (Sites *et al.* 1996; Baker *et al.* 1998; Wiens 2004; O'Leary and Gatesy 2008), to find out if resolution at species level would improve and if plumage variation is supported by genotypic differences.

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APPENDICES

Appendix 1. Reclassification of the species formerly placed in *Aratinga* by Peters (1937) according to Ferraroni & Silveira taxonomic revision.

Aratinga (type species: *solstitialis*)

Aratinga solstitialis (Linnaeus, 1758)

Aratinga maculata (Statius Muller, 1776)

Aratinga jandaya (Gmelin, 1788)

Aratinga auricapillus (Kuhl, 1820)

Aratinga weddellii (Deville, 1851)

Aratinga nenday (Vieillot, 1823)

Eupsittula (type species: *canicularis*)

Eupsittula canicularis (Linnaeus, 1758)

Eupsittula astec (Souancé, 1857)

Eupsittula nana (Vigors, 1830)

Eupsittula pertinax (Linnaeus, 1758)

Eupsittula ocularis (Sclater & Salvin, 1864)

Eupsittula arubensis (Hartert, 1892)

Eupsittula xanthogenia (Bonaparte, 1850)

Eupsittula tortugensis (Cory, 1909)

Eupsittula aeruginosa (Linnaeus, 1758)

Eupsittula margaritensis (Cory, 1918)

Eupsittula chrysophrys (Swainson, 1838)

Eupsittula surinama (Zimmer & Phelps, 1951)

Eupsittula paraensis (Sick, 1959)

Eupsittula aurea (Gmelin, 1788)

Eupsittula cactorum (Kuhl, 1820)

Thectocercus (type species: *acuticaudatus*)

Thectocercus acuticaudatus (Vieillot, 1817)

Thectocercus haemorrhous (Spix, 1824)

Psittacara (type species : *leucophthalmus*)

Psittacara leucophthalmus (Statius Muller, 1776)

Psittacara holochlorus (Sclater, 1859)

Psittacara brevipes (Lawrence, 1871)

Psittacara rubritorquis (Sclater, 1886)

Psittacara finschi (Salvin, 1871)

Psittacara euops (Wagler, 1832)

Psittacara chloropterus Souancé, 1856

Psittacara maugei Souancé, 1856

Psittacara wagleri (Gray, 1845)

Psittacara frontatus (Cabanis, 1846)

Psittacara erythrogenys (Lesson, 1844)

Psittacara mitratus (Tschudi, 1844)

Psittacara chlorogenys (Arndt, 2006)

Psittacara alticolus (Chapman, 1921)

Appendix 2. List of analyzed skins with nomenclature according to Ferraroni & Silveira taxonomic revision, where “NA” refers to missing data.

2.1 Examined specimens selected as outgroup.

Species	Number	Sex	Country	State/Region	Locality
<i>A. ararauna</i>	MZUSP2250	M	Brazil	Amazonas	R. Juruá
<i>A. ararauna</i>	MZUSP21284	F	Brazil	Amazonas	R. Amazonas (Sul), Lago do Baptista
<i>A. ararauna</i>	MZUSP21285	M	Brazil	Amazonas	R. Amazonas (Sul), Lago do Baptista
<i>A. ararauna</i>	MZUSP24542	M	Brazil	Amazonas	R. Juruá, R. Eiru, Santa Cruz
<i>A. ararauna</i>	MZUSP24543	M	Brazil	Amazonas	R. Juruá, R. Eiru, Santa Cruz
<i>A. ararauna</i>	MZUSP42972	F	Brazil	Amazonas	Mun. Jamundá, Paraná Bom Jardim
<i>A. ararauna</i>	MZUSP38317	M	Brazil	Pará	Cachimbo
<i>A. ararauna</i>	MZUSP42971	M	Brazil	Pará	Mun. de Faro, Paraná Bom Jardim
<i>A. ararauna</i>	MZUSP79505	F	Brazil	Tocantins	ESEC Serra Geral do Tocantins
<i>A. ararauna</i>	MZUSP79506	M	Brazil	Tocantins	ESEC Serra Geral do Tocantins
<i>A. ararauna</i>	MZUSP14904	M	Brazil	Goiás	Jaraguá, Rio das Almas
<i>A. ararauna</i>	MZUSP30170	F	Brazil	Mato Grosso	Faz. Aricá, Rio Aricá
<i>A. ararauna</i>	MZUSP30171	M	Brazil	Mato Grosso	Faz. Aricá, Rio Aricá
<i>A. ararauna</i>	MZUSP32291	M	Brazil	Mato Grosso	Chavantina, rio das Mortes
<i>A. ararauna</i>	MZUSP32292	M	Brazil	Mato Grosso	Chavantina, rio das Mortes
<i>A. ararauna</i>	MZUSP32293	M	Brazil	Mato Grosso	Chavantina, rio das Mortes
<i>A. ararauna</i>	MZUSP32294	M	Brazil	Mato Grosso	Chavantina, rio das Mortes
<i>A. ararauna</i>	MZUSP32295	M	Brazil	Mato Grosso	Chavantina, rio das Mortes
<i>A. ararauna</i>	MZUSP32296	F	Brazil	Mato Grosso	Chavantina, rio das Mortes
<i>A. ararauna</i>	MZUSP35008	M	Brazil	Mato Grosso	São Domingos, Rio das Mortes
<i>A. ararauna</i>	MZUSP12178	M	Brazil	Mato Grosso do Sul	Coxim
<i>A. ararauna</i>	MZUSP64141	F	Brazil	Mato Grosso do Sul	R. Sucuriu (margem direita), Três Lagoas
<i>A. ararauna</i>	MZUSP5168	M	Brazil	São Paulo	Itapura
<i>A. ararauna</i>	MZUSP5169	M	Brazil	São Paulo	Itapura
<i>A. ararauna</i>	MZUSP11810	M	Brazil	São Paulo	Itapura
<i>A. ararauna</i>	MZUSP11811	F	Brazil	São Paulo	Itapura
<i>A. ararauna</i>	MZUSP23780	M	Brazil	São Paulo	Faz. Sta. Rosa, Parauna, Ribeirao Mato Grosso, Municipio de Monte Aprazivel
<i>A. ararauna</i>	MZUSP23781	NA	Brazil	São Paulo	Faz. Sta. Rosa, Parauna, Ribeirao Mato Grosso, Municipio de Monte Aprazivel
<i>A. ararauna</i>	MZUSP94564	NA	Brazil	Goiás	Campinaçu
<i>C. spixii</i>	MZUSP2114	NA	Brazil	East	NA
<i>C. spixii</i>	MZUSP43409	M JUV	Brazil	Bahia	NA
<i>C. spixii</i>	MZUSP75443	NA	Brazil	NA	NA
<i>C. spixii</i>	USNM351680	F	captivity	NA	Natural Zoological Park
<i>D. nobilis</i>	MZUSP55819	M	Brazil	Roraima	R. Mucajá, afl. Rio Branco, Sul de Boa Vista
<i>D. nobilis</i>	MZUSP77936	F	Brazil	Roraima	Ilha do Terçado, Boa Vista
<i>D. nobilis</i>	MZUSP78991	M	Brazil	Roraima	Faz. Mimi, Bonfim
<i>D. nobilis</i>	MZUSP15897	M	Brazil	Pará	R. Amazonas (Norte), Patauí
<i>D. nobilis</i>	MZUSP15898	F	Brazil	Pará	R. Amazonas (Norte), Patauí
<i>D. nobilis</i>	MZUSP20937	F	Brazil	Pará	R. Amazonas (Norte), Patauí
<i>D. nobilis</i>	MZUSP22311	F	Brazil	Pará	R. Amazonas (Norte), Patauí
<i>D. nobilis</i>	MZUSP7077	NA	British	NA	NA

			Guiana		
<i>D. nobilis</i>	USNM626124	M	Guyana	Upper Takutu-Upper Essequibo	Karaudanawa, ca 4 km S
<i>D. nobilis</i>	USNM515377	M	Brazil	Rio Mucaja	Roraima, S of Boa Vista
<i>D. nobilis</i>	USNM97801	NA	Guyana	NA	NA
<i>D. nobilis</i>	FMNH190579	F	British Guiana	NA	Abary River, E.C.D.
<i>D. nobilis</i>	FMNH32210	M	British Guiana	NA	Monte Roraima
<i>D. nobilis</i>	FMNH108118	F	British Guiana	NA	Demeram, Buxton, E.C.
<i>D. nobilis</i>	FMNH108119	M	British Guiana	NA	Buxton, east Coast
<i>D. nobilis</i>	FMNH45046	F	Brazil	Amazonas	Serra da Lua, Boa Vista
<i>D. nobilis</i>	FMNH45047	M	Brazil	Amazonas	Serra da Lua, Boa Vista
<i>D. nobilis</i>	MZUSP38319	F	Brazil	Pará	Cachimbo
<i>D. nobilis</i>	MZUSP81991	F	Brazil	Pará	Faz. Fartura, Santana do Araguaia
<i>D. nobilis</i>	MZUSP81992	M	Brazil	Pará	Faz. Fartura, Santana do Araguaia
<i>D. nobilis</i>	MZUSP88048	M	Brazil	Pará	Fazenda Fartura, Santana do Araguaia
<i>D. nobilis</i>	MZUSP88049	M	Brazil	Pará	Fazenda Fartura, Santana do Araguaia
<i>D. nobilis</i>	MZUSP88050	F	Brazil	Pará	Fazenda Fartura, Santana do Araguaia
<i>D. nobilis</i>	MZUSP88051	NA	Brazil	Pará	Fazenda Fartura, Santana do Araguaia
<i>D. nobilis</i>	MZUSP89883	F	Brazil	Pará	Faz. Fartura, Santana do Araguaia
<i>D. nobilis</i>	MZUSP6830	M	Brazil	Maranhão	Boa Vista
<i>D. nobilis</i>	MZUSP6831	F	Brazil	Maranhão	Boa Vista
<i>D. nobilis</i>	MZUSP85819	F	Brazil	Alagoas	Mata Santa Justina, Usina Santo Antônio, Passo de Camaragibe
<i>D. nobilis</i>	MZUSP40843	M	Brazil	Bahia	Buritirama, Mun. de Barra
<i>D. nobilis</i>	MZUSP40844	M	Brazil	Bahia	Buritirama, Mun. de Barra
<i>D. nobilis</i>	MZUSP40845	F	Brazil	Bahia	Buritirama, Mun. de Barra
<i>D. nobilis</i>	MZUSP40846	F	Brazil	Bahia	Buritirama, Mun. de Barra
<i>D. nobilis</i>	MZUSP40847	F	Brazil	Bahia	Buritirama, Mun. de Barra
<i>D. nobilis</i>	FMNH48995	M	Brazil	Maranhão	Miritiba
<i>D. nobilis</i>	FMNH257861	NA	Brazil	Pará	Jacuara, Rio Amazonas
<i>D. nobilis</i>	FMNH62878	F	Brazil	Maranhão	Rosario
<i>D. nobilis</i>	FMNH62875	F	Brazil	Maranhão	Turry-assu
<i>D. nobilis</i>	FMNH62877	F	Brazil	Maranhão	Turry-assu
<i>D. nobilis</i>	FMNH62876	F JUV	Brazil	Maranhão	Turry-assu
<i>D. nobilis</i>	MZUSP52349	F	Brazil	Tocantins	Araguatins
<i>D. nobilis</i>	MZUSP52350	NA	Brazil	Tocantins	Araguatins
<i>D. nobilis</i>	MZUSP52351	M	Brazil	Tocantins	Araguatins
<i>D. nobilis</i>	MZUSP52352	M	Brazil	Tocantins	Araguatins
<i>D. nobilis</i>	MZUSP52353	M	Brazil	Tocantins	Araguatins
<i>D. nobilis</i>	MZUSP52354	F	Brazil	Tocantins	Araguatins
<i>D. nobilis</i>	MZUSP52355	M	Brazil	Tocantins	Araguatins
<i>D. nobilis</i>	MZUSP78527	F	Brazil	Tocantins	Ilha Bananal
<i>D. nobilis</i>	MZUSP78528	F	Brazil	Tocantins	Ilha Bananal
<i>D. nobilis</i>	MZUSP14890	F	Brazil	Goiás	Faz. Man. Peixoto, Rio das Almas
<i>D. nobilis</i>	MZUSP14891	M	Brazil	Goiás	Faz. Man. Peixoto, Rio das Almas
<i>D. nobilis</i>	MZUSP26707	M	Brazil	Goiás	Faz. Transvaal, Municipio de Rio Verde

<i>D. nobilis</i>	MZUSP26708	F	Brazil	Goiás	Faz. Transvaal, Municipio de Rio Verde
<i>D. nobilis</i>	MZUSP27950	M	Brazil	Goiás	Faz. Transvaal, Municipio de Rio Verde
<i>D. nobilis</i>	MZUSP27951	F	Brazil	Goiás	Faz. Transvaal, Municipio de Rio Verde
<i>D. nobilis</i>	MZUSP38043	F	Brazil	Goiás	Faz. Sta. Adelia, Jataí
<i>D. nobilis</i>	MZUSP61528	M	Brazil	Goiás	Jataí
<i>D. nobilis</i>	MZUSP65080	M	Brazil	Goiás	Aruanã
<i>D. nobilis</i>	MZUSP65081	F	Brazil	Goiás	Aruanã
<i>D. nobilis</i>	MZUSP65082	F	Brazil	Goiás	Aruanã
<i>D. nobilis</i>	MZUSP65083	F	Brazil	Goiás	Aruanã
<i>D. nobilis</i>	MZUSP65084	M	Brazil	Goiás	Aruanã
<i>D. nobilis</i>	MZUSP65085	F	Brazil	Goiás	Goiânia
<i>D. nobilis</i>	MZUSP65086	F	Brazil	Goiás	Goiânia
<i>D. nobilis</i>	MZUSP74026	M	Brazil	Goiás	R. Bagagem (margem esquerda), Serra Negra, Niquelândia
<i>D. nobilis</i>	MZUSP74618	F	Brazil	Goiás	Goianira
<i>D. nobilis</i>	MZUSP74619	M	Brazil	Goiás	Hidrolândia
<i>D. nobilis</i>	MZUSP17522	M	Brazil	Mato Grosso	Faz. Angelo Severo, Vale do Rio Araguaia
<i>D. nobilis</i>	MZUSP17523	M	Brazil	Mato Grosso	Faz. Angelo Severo, Vale do Rio Araguaia
<i>D. nobilis</i>	MZUSP30135	F	Brazil	Mato Grosso	Palmeiras
<i>D. nobilis</i>	MZUSP30136	F	Brazil	Mato Grosso	Faz. Aricá, Rio Aricá
<i>D. nobilis</i>	MZUSP30137	F	Brazil	Mato Grosso	Palmeiras
<i>D. nobilis</i>	MZUSP30138	M	Brazil	Mato Grosso	Cuiabá
<i>D. nobilis</i>	MZUSP30139	M	Brazil	Mato Grosso	Palmeiras
<i>D. nobilis</i>	MZUSP30140	M	Brazil	Mato Grosso	Faz. Aricá, Rio Aricá
<i>D. nobilis</i>	MZUSP30141	F	Brazil	Mato Grosso	Palmeiras
<i>D. nobilis</i>	MZUSP30142	NA	Brazil	Mato Grosso	Cuiabá
<i>D. nobilis</i>	MZUSP32298	F	Brazil	Mato Grosso	Chavantina, Rio das Mortes
<i>D. nobilis</i>	MZUSP35012	F	Brazil	Mato Grosso	Dumbá
<i>D. nobilis</i>	MZUSP35013	F	Brazil	Mato Grosso	Dumbá
<i>D. nobilis</i>	MZUSP35014	M	Brazil	Mato Grosso	Faz. Domingos, Rio das Mortes
<i>D. nobilis</i>	MZUSP80123	F	Brazil	Mato Grosso	Barra do Garça
<i>D. nobilis</i>	MZUSP83000	NA	Brazil	Mato Grosso	Fazenda Iracema, Município Cláudia
<i>D. nobilis</i>	MZUSP5089	M	Brazil	Mato Grosso do Sul	R. Paraná, Porto Faia
<i>D. nobilis</i>	MZUSP5091	M	Brazil	Mato Grosso do Sul	R. Paraná, Porto Faia
<i>D. nobilis</i>	MZUSP5093	F	Brazil	Mato Grosso do Sul	R. Paraná, Porto Faia
<i>D. nobilis</i>	MZUSP12215	M	Brazil	Mato Grosso do Sul	Miranda
<i>D. nobilis</i>	MZUSP12224	M	Brazil	Mato Grosso do Sul	Miranda
<i>D. nobilis</i>	MZUSP12236	F	Brazil	Mato Grosso do Sul	Coxim
<i>D. nobilis</i>	MZUSP12704	M	Brazil	Mato Grosso do Sul	Santana do Paranaíba
<i>D. nobilis</i>	MZUSP12708	F	Brazil	Mato Grosso do Sul	Santana do Paranaíba
<i>D. nobilis</i>	MZUSP17093	M	Brazil	Mato Grosso do Sul	Faz. Recreio, Coxim
<i>D. nobilis</i>	MZUSP15753	F	Brazil	Minas Gerais	R. Bandeiro
<i>D. nobilis</i>	MZUSP61529	F	Brazil	Minas Gerais	Comendador Gomes
<i>D. nobilis</i>	MZUSP61530	F	Brazil	Minas Gerais	Comendador Gomes
<i>D. nobilis</i>	MZUSP6399	M	Brazil	Espírito Santo	NA
<i>D. nobilis</i>	MZUSP35408	M	Brazil	São Paulo	Faz. Taquari
<i>D. nobilis</i>	MZUSP5088	F	Brazil	São Paulo	Itapura
<i>D. nobilis</i>	MZUSP80124	NA	Brazil	NA	NA
<i>D. nobilis</i>	FMNH334957	M	Bolivia	Santa Cruz	Prov. Nuflo de Chaver, Concepcion

<i>D. nobilis</i>	FMNH75206	F	Brazil	Goiás	Rio São Miguel
<i>D. nobilis</i>	FMNH75208	F	Brazil	Goiás	Rio São Miguel
<i>D. nobilis</i>	FMNH75207	F	Brazil	Goiás	Rio São Miguel
<i>D. nobilis</i>	FMNH75205	F	Brazil	Goiás	Rio São Miguel
<i>D. nobilis</i>	FMNH75209	F	Brazil	Goiás	Veadeiros
<i>G. guarouba</i>	MZUSP11057	M	Brazil	Pará	R. Tocantins
<i>G. guarouba</i>	MZUSP11058	F	Brazil	Pará	R. Tocantins
<i>G. guarouba</i>	MZUSP43976	M	Brazil	Pará	Mun. Capim, BR 14, Km 93, Estrada Belém-Brasília
<i>G. guarouba</i>	MZUSP43977	M	Brazil	Pará	Mun. Capim, BR 14, Km 93, Estrada Belém-Brasília
<i>G. guarouba</i>	MZUSP43978	M	Brazil	Pará	Mun. Capim, BR 14, Km 93, Estrada Belém-Brasília
<i>G. guarouba</i>	MZUSP43979	M	Brazil	Pará	Mun. Capim, BR 14, Km 93, Estrada Belém-Brasília
<i>G. guarouba</i>	MZUSP43980	F	Brazil	Pará	Mun. Capim, BR 14, Km 93, Estrada Belém-Brasília
<i>G. guarouba</i>	MZUSP43981	M	Brazil	Pará	Mun. Capim, BR 14, Km 93, Estrada Belém-Brasília
<i>G. guarouba</i>	MZUSP43982	M	Brazil	Pará	Mun. Capim, BR 14, Km 93, Estrada Belém-Brasília
<i>G. guarouba</i>	MZUSP43983	F	Brazil	Pará	Mun. Capim, BR 14, Km 93, Estrada Belém-Brasília
<i>G. guarouba</i>	MZUSP56313	M	Brazil	Pará	R. Tapajós (Leste), Fordlândia
<i>G. guarouba</i>	MZUSP64771	M	Brazil	Pará	Fordlândia (margem direita do Rio Tapajos)
<i>G. guarouba</i>	MZUSP64772	M	Brazil	Pará	Fordlândia (margem direita do Rio Tapajos)
<i>G. guarouba</i>	LSUMZ39654	F	captivity	California	Aviary bird, Rudkin
<i>G. guarouba</i>	FMNH355154	M	captivity	Florida	Busch Gardens
<i>G. guarouba</i>	FMNH277667	NA	captivity	NA	NA
<i>G. guarouba</i>	FMNH371821	NA	captivity	Miami	Parrot Jungle
<i>G. guarouba</i>	FMNH371820	M	captivity	Miami	Parrot Jungle
<i>G. guarouba</i>	FMNH301892	F	captivity	Brazil	Boehm Aviaries
<i>O. icterotis</i>	AMNH109410	M	Colombia	Cauaca	Coast range W of Popayan, 10340 feet
<i>O. icterotis</i>	AMNH133016	M	Colombia	Antioquia	La Frijolera, 5000 ft.
<i>O. icterotis</i>	AMNH133018	F	Colombia	Antioquia	La Frijolera, 5000 ft.
<i>O. icterotis</i>	AMNH111441	M	Colombia	Rio Toche	E. Quindio Andes, Tolima
<i>O. icterotis</i>	AMNH111448	M	Colombia	Rio Toche	E. Quindio Andes, Tolima
<i>O. icterotis</i>	AMNH111444	F	Colombia	Rio Toche	E. Quindio Andes, Tolima
<i>O. icterotis</i>	AMNH109409	NA	Colombia	Cauaca	Coast range W of Popayan, 10340 feet
<i>O. icterotis</i>	MZUSP133020	F	Colombia	Antioquia	La Frijolera, 5000 ft.
<i>O. icterotis</i>	USNM111446	M	Colombia	Rio Toche	E Quindio Andes, Tolima
<i>O. icterotis</i>	USNM133019	F	Colombia	Antioquia	La Frijolera, 5000 ft.
<i>O. icterotis</i>	USNM111451	F	Colombia	Rio Toche	E Quindio Andes, Tolima
<i>O. icterotis</i>	USNM255826	F	Colombia	Rio Toche	E Quindio Andes, Tolima
<i>O. icterotis</i>	USNM445961	M	Colombia	Cauaca	Tijeras, 8400 ft
<i>O. icterotis</i>	USNM85912	NA	Colombia	Bogota	NA
<i>O. icterotis</i>	USNM445962	M	Colombia	Cauaca	Tijeras, 8400 ft
<i>O. icterotis</i>	USNM445963	F	Colombia	Cauaca	Tijeras, 8400 ft
<i>O. icterotis</i>	FMNH251025	M	Colombia	Narino	Ricaurte, 2500 m
<i>O. icterotis</i>	FMNH251023	F	Colombia	Narino	Ricaurte, 2500 m

<i>O. icterotis</i>	FMNH251024	F	Colombia	Narino	Ricaurte, 2500 m
<i>O. icterotis</i>	FMNH111445	NA	Colombia	Tolima	Rio Toche, E Quindio Andes, 6800 ft
<i>O. icterotis</i>	FMNH111450	F	Colombia	Tolima	Rio Toche, E Quindio Andes, 6800 ft
<i>O. icterotis</i>	FMNH251026	M	Colombia	Narino	Ricaurte, 2500 m
<i>L. branickii</i>	AMNH474611	NA	Peru	NA	NA
<i>L. branickii</i>	AMNH169560	M	Peru	Junin	Maraynioc, 10850 feet
<i>L. branickii</i>	AMNH166740	M	Ecuador	Cord. De Chilla, Prov. Del Oro	Taraguacocha, Zaruma-Zaraguro trail
<i>L. branickii</i>	AMNH173969	F	Peru	Junin	Rumicruz, 9700 feet
<i>L. branickii</i>	AMNH474612	NA	Peru	NA	NA
<i>L. branickii</i>	USNM459503	F	Colombia	Cauca	Gabriel Lopez
<i>L. branickii</i>	USNM457780	F	Colombia	Cauca	Puracé, 9500 ft
<i>L. branickii</i>	USNM457779	F	Colombia	Cauca	Puracé, 9500 ft
<i>L. branickii</i>	USNM457778	M	Colombia	Cauca	Puracé, 9500 ft
<i>L. branickii</i>	LSUMZ87251	F	Peru	Amazonas	Cordillera Colan, SE La Peca, 7900 ft
<i>L. branickii</i>	LSUMZ73793	M	Peru	Huanuco	Shaigua Bosque
<i>L. branickii</i>	LSUMZ87249	M	Peru	Amazonas	Cordillera Colan, NE La Peca
<i>L. branickii</i>	LSUMZ87248	F	Peru	Amazonas	Cordillera Colan, E La Peca
<i>L. branickii</i>	LSUMZ91667	F	Peru	La Libertad	Mashua, E Tayabamba, 3350 m
<i>L. branickii</i>	LSUMZ104446	F	Peru	San Martin	Puerta del Monte, 30 km NE Los Alisos, ca 3250 m
<i>L. branickii</i>	LSUMZ73799	M	Peru	Huanuco	bosque Tapra above Acomayo
<i>L. branickii</i>	LSUMZ73796	M	Peru	Huanuco	Huailaspampa
<i>L. branickii</i>	LSUMZ73795	M	Peru	Huanuco	Huailaspampa
<i>L. branickii</i>	LSUMZ77980	M	Peru	Huanuco	Mesion Punta, above Acomayo
<i>L. branickii</i>	FMNH287972	M	Colombia	Narino	Llorente, 1800 m
<i>L. branickii</i>	FMNH287975	F	Colombia	Narino	Llorente, 1800 m
<i>L. branickii</i>	FMNH287971	M	Colombia	Narino	Llorente, 1800 m
<i>L. branickii</i>	FMNH287973	F	Colombia	Narino	Llorente, 1800 m
<i>L. branickii</i>	FMNH287974	F	Colombia	Narino	Llorente, 1800 m
<i>L. branickii</i>	FMNH287976	F	Colombia	Narino	Llorente, 1800 m
<i>O. manilata</i>	MZUSP55817	M	Brazil	Roraima	R. Mucajaí, afl. Rio Branco, Sul de Boa Vista
<i>O. manilata</i>	MZUSP55818	F	Brazil	Roraima	R. Mucajaí, afl. Rio Branco, Sul de Boa Vista
<i>O. manilata</i>	MZUSP78997	M	Brazil	Roraima	Pacaraima, Comunidade Nova Esperança
<i>O. manilata</i>	MZUSP78998	M	Brazil	Roraima	Pacaraima, Comunidade Nova Esperança
<i>O. manilata</i>	MZUSP21303	F	Brazil	Amazonas	Itacoatiara, Rio Amazonas
<i>O. manilata</i>	MZUSP22876	M	Brazil	Amazonas	R. Amazonas, Igarapé Aneba
<i>O. manilata</i>	MZUSP15725	F	Brazil	Pará	R. Amazonas (Norte), Pataua
<i>O. manilata</i>	MZUSP15726	M	Brazil	Pará	R. Amazonas (Norte), Pataua
<i>O. manilata</i>	MZUSP20472	F	Brazil	Pará	R. Tapajós (Leste), Caxiricatuba
<i>O. manilata</i>	MZUSP20572	M	Brazil	Pará	R. Tapajós (Leste), Caxiricatuba
<i>O. manilata</i>	MZUSP20575	M	Brazil	Pará	R. Tapajós (Leste), Caxiricatuba
<i>O. manilata</i>	MZUSP20998	F	Brazil	Pará	R. Amazonas, Foz do Rio Curua
<i>O. manilata</i>	MZUSP20999	M	Brazil	Pará	R. Tapajós (Leste), Caxiricatuba
<i>O. manilata</i>	MZUSP21000	F	Brazil	Pará	R. Tapajós (Leste), Caxiricatuba
<i>O. manilata</i>	MZUSP22329	M	Brazil	Pará	R. Amazonas, Foz do Rio Curua
<i>O. manilata</i>	MZUSP22330	F	Brazil	Pará	R. Amazonas, Foz do Rio Curua
<i>O. manilata</i>	MZUSP22331	M	Brazil	Pará	Foz do Rio Curua

<i>O. manilata</i>	MZUSP22332	M	Brazil	Pará	R. Tapajós (Leste), Caxiricatuba
<i>O. manilata</i>	MZUSP22460	M	Brazil	Pará	R. Tapajós (Leste), Caxiricatuba
<i>O. manilata</i>	MZUSP22494	F	Brazil	Pará	R. Tapajós (Leste), Caxiricatuba
<i>O. manilata</i>	MZUSP22577	NA	Brazil	Pará	R. Tapajós (Leste), Caxiricatuba
<i>O. manilata</i>	MZUSP22610	F	Brazil	Pará	R. Tapajós (Leste), Caxiricatuba
<i>O. manilata</i>	MZUSP38318	M	Brazil	Pará	Cachimbo
<i>O. manilata</i>	MZUSP84589	M	Brazil	Pará	Br 230 transamazônica, Km223
<i>O. manilata</i>	MZUSP76577	M	Brazil	Rondônia	E.E. Antônio Mujica Nava
<i>O. manilata</i>	MZUSP79510	M	Brazil	Tocantins	ESEC Serra Geral do Tocantins
<i>O. manilata</i>	MZUSP14884	F	Brazil	Goiás	R. das Almas, Faz. Man. Peixoto
<i>O. manilata</i>	MZUSP27945	M	Brazil	Goiás	Faz. Transvaal, mun. de R. Verde
<i>O. manilata</i>	MZUSP27946	M	Brazil	Goiás	Faz. Transvaal, mun. de R. Verde
<i>O. manilata</i>	MZUSP27947	M	Brazil	Goiás	Faz. Transvaal, mun. de R. Verde
<i>O. manilata</i>	MZUSP27948	F	Brazil	Goiás	Faz. Transvaal, mun. de R. Verde
<i>O. manilata</i>	MZUSP27949	F	Brazil	Goiás	Faz. Transvaal, mun. de R. Verde
<i>O. manilata</i>	MZUSP11332	M	Brazil	Mato Grosso	R. Mauro
<i>O. manilata</i>	MZUSP32297	F	Brazil	Mato Grosso	Chavantina, Rio das Mortes
<i>O. manilata</i>	MZUSP35009	F	Brazil	Mato Grosso	São Domingos, Rio das Mortes
<i>O. manilata</i>	MZUSP35010	F	Brazil	Mato Grosso	São Domingos, Rio das Mortes
<i>O. manilata</i>	MZUSP35011	M	Brazil	Mato Grosso	R. das Mortes
<i>O. manilata</i>	USNM128488	M	British Guiana	NA	Roraima
<i>O. manilata</i>	USNM621096	M	Guyana	Berbice district	West bank Berbice River, Dubulay Ranch
<i>O. manilata</i>	USNM448574	F	Venezuela	Anzoategui	El Tigre
<i>O. manilata</i>	USNM625357	M	Guyana	West bank Upper Essequibo River	Gunn's Landing
<i>O. manilata</i>	USNM626152	F	Guyana	Parabara Savannah	NA
<i>O. manilata</i>	USNM625358	F	Guyana	West bank Upper Essequibo River	Gunn's Landing
<i>O. manilata</i>	USNM145658	M	British Guiana	NA	Roraima
<i>O. manilata</i>	FMNH111696	NA	Colombia	Meta	Villa Vicencio
<i>O. manilata</i>	FMNH190570	F	British Guiana	NA	Abary River
<i>O. manilata</i>	FMNH45036	M	Brazil	Amazonas	Rio Branco, Boa Vista
<i>O. manilata</i>	FMNH43871	M	British Guiana	NA	NA
<i>O. manilata</i>	FMNH190571	M	British Guiana	NA	Abary River
<i>O. manilata</i>	FMNH257850	NA	Brazil	Pará	Santarem, Rio Tapajos
<i>P. maracana</i>	MZUSP8590	M	Brazil	Maranhão	Miritiba
<i>P. maracana</i>	MZUSP8591	F	Brazil	Maranhão	Miritiba
<i>P. maracana</i>	MZUSP15758	F	Brazil	Goiás	Barra do Rio São Domingos
<i>P. maracana</i>	MZUSP15759	M	Brazil	Goiás	Barra do Rio São Domingos
<i>P. maracana</i>	MZUSP17092	M	Brazil	Mato Grosso	Rondonópolis
<i>P. maracana</i>	MZUSP12578	NA	Brazil	Mato Grosso do Sul	Aquidauana
<i>P. maracana</i>	MZUSP1582	NA	Brazil	Minas Gerais	V. Alegre
<i>P. maracana</i>	MZUSP24514	F	Brazil	Minas Gerais	Alto Rio Doce
<i>P. maracana</i>	MZUSP1968	NA	Brazil	São Paulo	Bauru, Rio Feio
<i>P. maracana</i>	MZUSP1969	NA	Brazil	São Paulo	Bauru, Rio Feio
<i>P. maracana</i>	MZUSP4487	F	Brazil	São Paulo	Avanhandava

<i>P. maracana</i>	MZUSP9851	F	Brazil	São Paulo	Vila Olímpia
<i>P. maracana</i>	MZUSP7026	M	Brazil	Paraná	Faz. Monte Alegre
<i>P. maracana</i>	MZUSP8094	M	Brazil	Rio Grande do Sul	NA
<i>P. maracana</i>	MZUSP9093	M	Brazil	Rio Grande do Sul	NA
<i>P. maracana</i>	FMNH69241	F	Brazil	Paraná	Candido de Abreu
<i>P. maracana</i>	FMNH46986	M	Brazil	Bahia	Rio do Peixe, nr Queimadas
<i>P. maracana</i>	FMNH69240	M	Brazil	Paraná	Candido de Abreu
<i>P. maracana</i>	FMNH46987	M	Brazil	Bahia	Rio do Peixe, nr Queimadas
<i>P. maracana</i>	FMNH46982	M	Brazil	Bahia	Rio do Peixe, nr Queimadas
<i>P. maracana</i>	FMNH46983	F	Brazil	Bahia	Rio do Peixe, nr Queimadas
<i>P. maracana</i>	FMNH46984	F	Brazil	Bahia	Rio do Peixe, nr Queimadas
<i>P. maracana</i>	FMNH46985	F	Brazil	Bahia	Rio do Peixe, nr Queimadas
<i>C. carolinensis</i>	AMNH16312	F	United States	Florida	Osceola Co.
<i>C. carolinensis</i>	AMNH753745	M JUV	United States	N.Hampshire	Locke Lake
<i>C. carolinensis</i>	AMNH39044	M	United States	Fla	Sebastian River
<i>C. carolinensis</i>	AMNH99457	M	United States	Fla	near Fanta, St.Lucia
<i>C. carolinensis</i>	AMNH753754	M JUV	United States	Florida	Kissimmee River
<i>C. carolinensis</i>	AMNH753739	NA	United States	Virginia	Ft. Meyer
<i>C. carolinensis</i>	AMNH753744	M	United States	Florida	Kissimmee River
<i>C. carolinensis</i>	AMNH39042	M	United States	Fla	Sebastian River
<i>C. carolinensis</i>	USNM3890	NA	United States	Arkansas	Fort Smith
<i>C. carolinensis</i>	USNM1228	NA	United States	Michigan?	NA
<i>C. carolinensis</i>	USNM4614	NA	United States	Arkansas	NA
<i>C. carolinensis</i>	USNM220628	M	United States	Florida	Osceola Co.
<i>C. carolinensis</i>	USNM208301	F	United States	Florida	Taylor Creek
<i>C. carolinensis</i>	USNM175802	M	United States	Florida	Taylor Creek
<i>C. carolinensis</i>	USNM220629	M	United States	Florida	Osceola Co.
<i>C. carolinensis</i>	USNM293697	F	United States	Florida	Osceola Co.
<i>P. frontalis</i>	MZUSP7322	M	Brazil	Bahia	Vila Nova
<i>P. frontalis</i>	MZUSP20339	F	Brazil	Mato Grosso do Sul	Barra do Paredão, Rio Paraná
<i>P. frontalis</i>	MZUSP20340	M	Brazil	Mato Grosso do Sul	Barra do Paredão, Rio Paraná
<i>P. frontalis</i>	MZUSP1583	NA	Brazil	Minas Gerais	Vargem Alegre
<i>P. frontalis</i>	MZUSP28097	M	Brazil	Espírito Santo	Chaves, Sta. Leopoldina
<i>P. frontalis</i>	MZUSP28098	F	Brazil	Espírito Santo	Chaves, Sta. Leopoldina
<i>P. frontalis</i>	MZUSP28099	F	Brazil	Espírito Santo	Chaves, Sta. Leopoldina
<i>P. frontalis</i>	MZUSP28100	F	Brazil	Espírito Santo	Chaves, Sta. Leopoldina
<i>P. frontalis</i>	MZUSP28101	F	Brazil	Espírito Santo	Chaves, Sta. Leopoldina

<i>P. frontalis</i>	MZUSP33041	F	Brazil	Rio de Janeiro	Faz. Guinle, Teresópolis
<i>P. frontalis</i>	MZUSP33042	M	Brazil	Rio de Janeiro	Faz. Guinle, Teresópolis
<i>P. frontalis</i>	MZUSP33043	M	Brazil	Rio de Janeiro	Faz. Guinle, Teresópolis
<i>P. frontalis</i>	MZUSP33044	F	Brazil	Rio de Janeiro	Faz. Guinle, Teresópolis
<i>P. frontalis</i>	MZUSP33045	M	Brazil	Rio de Janeiro	Faz. Guinle, Teresópolis
<i>P. frontalis</i>	MZUSP34134	F	Brazil	Rio de Janeiro	Maromba, Parque Nacional de Itatiaia
<i>P. frontalis</i>	MZUSP34135	M	Brazil	Rio de Janeiro	Maromba, Parque Nacional de Itatiaia
<i>P. frontalis</i>	MZUSP34136	M	Brazil	Rio de Janeiro	Maromba, Parque Nacional de Itatiaia
<i>P. frontalis</i>	MZUSP34137	M	Brazil	Rio de Janeiro	Maromba, Parque Nacional de Itatiaia
<i>P. frontalis</i>	MZUSP34138	F	Brazil	Rio de Janeiro	Maromba, Parque Nacional de Itatiaia
<i>P. frontalis</i>	MZUSP34139	M	Brazil	Rio de Janeiro	Maromba, Parque Nacional de Itatiaia
<i>P. frontalis</i>	MZUSP34293	M	Brazil	Rio de Janeiro	Maromba, Parque Nacional de Itatiaia
<i>P. frontalis</i>	MZUSP34294	M	Brazil	Rio de Janeiro	Maromba, Parque Nacional de Itatiaia
<i>P. frontalis</i>	MZUSP34752	M	Brazil	Rio de Janeiro	Maromba, Parque Nacional de Itatiaia
<i>P. frontalis</i>	MZUSP34753	F	Brazil	Rio de Janeiro	Maromba, Parque Nacional de Itatiaia
<i>P. frontalis</i>	MZUSP36130	M	Brazil	Rio de Janeiro	Maromba, Parque Nacional de Itatiaia
<i>P. frontalis</i>	MZUSP36131	M	Brazil	Rio de Janeiro	Maromba, Parque Nacional de Itatiaia
<i>P. frontalis</i>	MZUSP36420	F	Brazil	Rio de Janeiro	Ribeirão Maromba, Mauá
<i>P. frontalis</i>	MZUSP36421	M	Brazil	Rio de Janeiro	Ribeirão Maromba, Mauá
<i>P. frontalis</i>	MZUSP36422	M	Brazil	Rio de Janeiro	Ribeirão Maromba, Mauá
<i>P. frontalis</i>	MZUSP36423	F	Brazil	Rio de Janeiro	Ribeirão Maromba, Mauá
<i>P. frontalis</i>	MZUSP36424	M	Brazil	Rio de Janeiro	Ribeirão Maromba, Mauá
<i>P. frontalis</i>	MZUSP82	M	Brazil	São Paulo	Ilha de São Sebastião
<i>P. frontalis</i>	MZUSP83	M	Brazil	São Paulo	Ilha de São Sebastião
<i>P. frontalis</i>	MZUSP1165	M	Brazil	São Paulo	Jaboticabal
<i>P. frontalis</i>	MZUSP1166	F	Brazil	São Paulo	Jaboticabal
<i>P. frontalis</i>	MZUSP1628	M	Brazil	São Paulo	Rincão
<i>P. frontalis</i>	MZUSP1818	F	Brazil	São Paulo	R. Paranapanema
<i>P. frontalis</i>	MZUSP4660	M	Brazil	São Paulo	Bebedouro
<i>P. frontalis</i>	MZUSP4774	F	Brazil	São Paulo	Alto da Serra
<i>P. frontalis</i>	MZUSP7987	M	Brazil	São Paulo	Franca
<i>P. frontalis</i>	MZUSP8564	NA	Brazil	São Paulo	Albuquerque, Lins
<i>P. frontalis</i>	MZUSP8672	M	Brazil	São Paulo	Albuquerque, Lins
<i>P. frontalis</i>	MZUSP9854	M	Brazil	São Paulo	Vila Olímpia
<i>P. frontalis</i>	MZUSP9855	M	Brazil	São Paulo	Vila Olímpia
<i>P. frontalis</i>	MZUSP11425	M	Brazil	São Paulo	Icatu
<i>P. frontalis</i>	MZUSP11426	M	Brazil	São Paulo	Icatu
<i>P. frontalis</i>	MZUSP11427	M	Brazil	São Paulo	Braunau, NO de SP
<i>P. frontalis</i>	MZUSP11626	F	Brazil	São Paulo	São Miguel Arcanjo, Taquaral
<i>P. frontalis</i>	MZUSP11627	F	Brazil	São Paulo	São Miguel Arcanjo, Taquaral
<i>P. frontalis</i>	MZUSP12490	M	Brazil	São Paulo	ValParaíso
<i>P. frontalis</i>	MZUSP12491	M	Brazil	São Paulo	ValParaíso
<i>P. frontalis</i>	MZUSP12494	F	Brazil	São Paulo	ValParaíso
<i>P. frontalis</i>	MZUSP24385	M	Brazil	São Paulo	Faz. Poço Grande, Rio Juquiá
<i>P. frontalis</i>	MZUSP24386	F	Brazil	São Paulo	Faz. Poço Grande, Rio Juquiá
<i>P. frontalis</i>	MZUSP24387	F	Brazil	São Paulo	Faz. Poço Grande, Rio Juquiá
<i>P. frontalis</i>	MZUSP24388	M	Brazil	São Paulo	Faz. Poço Grande, Rio Juquiá
<i>P. frontalis</i>	MZUSP26717	NA	Brazil	São Paulo	Faz. Varjão, Lins
<i>P. frontalis</i>	MZUSP26718	M	Brazil	São Paulo	Faz. Varjão, Lins

<i>P. frontalis</i>	MZUSP26719	F	Brazil	São Paulo	Faz. Varjão, Lins
<i>P. frontalis</i>	MZUSP26720	M	Brazil	São Paulo	Faz. Varjão, Lins
<i>P. frontalis</i>	MZUSP27167	M	Brazil	São Paulo	Serra da Bocaina, divisa de RJ com SP
<i>P. frontalis</i>	MZUSP27168	M	Brazil	São Paulo	Serra da Bocaina, divisa de RJ com SP
<i>P. frontalis</i>	MZUSP28722	F	Brazil	São Paulo	Lins, Rio Tibiriçá
<i>P. frontalis</i>	MZUSP29241	M	Brazil	São Paulo	Serra da Bocaina, divisa de RJ com SP
<i>P. frontalis</i>	MZUSP29242	M	Brazil	São Paulo	Serra da Bocaina, divisa de RJ com SP
<i>P. frontalis</i>	MZUSP29243	F	Brazil	São Paulo	Serra da Bocaina, divisa de RJ com SP
<i>P. frontalis</i>	MZUSP31005	F	Brazil	São Paulo	Iporanga
<i>P. frontalis</i>	MZUSP31006	M	Brazil	São Paulo	Iporanga
<i>P. frontalis</i>	MZUSP31183	NA	Brazil	São Paulo	São Francisco Xavier, Serra da Mantiqueira
<i>P. frontalis</i>	MZUSP31643	M	Brazil	São Paulo	Boracéia
<i>P. frontalis</i>	MZUSP31644	F	Brazil	São Paulo	Boracéia
<i>P. frontalis</i>	MZUSP31752	F	Brazil	São Paulo	Faz. Sta. Maria, Lucélia
<i>P. frontalis</i>	MZUSP31753	M	Brazil	São Paulo	Faz. Rami, Lucélia
<i>P. frontalis</i>	MZUSP31871	M	Brazil	São Paulo	R. Paranapanema, Porto Marcondes
<i>P. frontalis</i>	MZUSP31872	F	Brazil	São Paulo	R. Paranapanema, Porto Marcondes
<i>P. frontalis</i>	MZUSP31873	F	Brazil	São Paulo	R. Paranapanema, Porto Marcondes
<i>P. frontalis</i>	MZUSP32143	M	Brazil	São Paulo	Faz. Poço Grande, Rio Juquiá
<i>P. frontalis</i>	MZUSP34096	F	Brazil	São Paulo	Aguapeú, Santos
<i>P. frontalis</i>	MZUSP42857	F	Brazil	São Paulo	Faz. Barreiro Rico, Anhembi
<i>P. frontalis</i>	MZUSP42858	M	Brazil	São Paulo	Faz. Barreiro Rico, Anhembi
<i>P. frontalis</i>	MZUSP43177	F	Brazil	São Paulo	Faz. Barreiro Rico, Anhembi
<i>P. frontalis</i>	MZUSP43178	M	Brazil	São Paulo	Faz. Barreiro Rico, Anhembi
<i>P. frontalis</i>	MZUSP43364	M	Brazil	São Paulo	Faz. Barreiro Rico, Anhembi
<i>P. frontalis</i>	MZUSP43704	M	Brazil	São Paulo	Caraguatatuba
<i>P. frontalis</i>	MZUSP43705	F	Brazil	São Paulo	Caraguatatuba
<i>P. frontalis</i>	MZUSP43706	F	Brazil	São Paulo	Caraguatatuba
<i>P. frontalis</i>	MZUSP43764	M	Brazil	São Paulo	Varjão do Guaratuba, Santos
<i>P. frontalis</i>	MZUSP43765	F	Brazil	São Paulo	Varjão do Guaratuba, Santos
<i>P. frontalis</i>	MZUSP47558	M	Brazil	São Paulo	R. Ipiranga, Tamanduá
<i>P. frontalis</i>	MZUSP47559	F	Brazil	São Paulo	R. Ipiranga, Tamanduá
<i>P. frontalis</i>	MZUSP47560	F	Brazil	São Paulo	R. Ipiranga, Tamanduá
<i>P. frontalis</i>	MZUSP47561	M	Brazil	São Paulo	R. Ipiranga, Tamanduá
<i>P. frontalis</i>	MZUSP47562	M	Brazil	São Paulo	R. Ipiranga, Tamanduá
<i>P. frontalis</i>	MZUSP47563	F	Brazil	São Paulo	R. Ipiranga, Tamanduá
<i>P. frontalis</i>	MZUSP47564	F	Brazil	São Paulo	R. Ipiranga, Tamanduá
<i>P. frontalis</i>	MZUSP47565	F	Brazil	São Paulo	R. Ipiranga, Tamanduá
<i>P. frontalis</i>	MZUSP47566	M	Brazil	São Paulo	R. Ipiranga, Tamanduá
<i>P. frontalis</i>	MZUSP49410	F	Brazil	São Paulo	Ribeirão Fundo
<i>P. frontalis</i>	MZUSP49411	NA	Brazil	São Paulo	Ribeirão Fundo
<i>P. frontalis</i>	MZUSP49412	F	Brazil	São Paulo	Morretinho
<i>P. frontalis</i>	MZUSP51297	M	Brazil	São Paulo	Barra do Rio Guaraú
<i>P. frontalis</i>	MZUSP51298	M	Brazil	São Paulo	Barra do Rio Guaraú
<i>P. frontalis</i>	MZUSP51299	M	Brazil	São Paulo	Barra do Rio Guaraú
<i>P. frontalis</i>	MZUSP51300	M	Brazil	São Paulo	Barra do Rio Guaraú
<i>P. frontalis</i>	MZUSP51301	M	Brazil	São Paulo	Barra do Rio Guaraú
<i>P. frontalis</i>	MZUSP51302	F	Brazil	São Paulo	Barra do Rio Guaraú

<i>P. frontalis</i>	MZUSP51303	NA	Brazil	São Paulo	Barra do Rio Guaraú
<i>P. frontalis</i>	MZUSP51304	F	Brazil	São Paulo	Barra do Rio Guaraú
<i>P. frontalis</i>	MZUSP51305	M	Brazil	São Paulo	Barra do Rio Guaraú
<i>P. frontalis</i>	MZUSP51306	M	Brazil	São Paulo	Barra do Rio Guaraú
<i>P. frontalis</i>	MZUSP51307	M	Brazil	São Paulo	Barra do Rio Guaraú
<i>P. frontalis</i>	MZUSP51308	M	Brazil	São Paulo	Barra do Rio Guaraú
<i>P. frontalis</i>	MZUSP51309	F	Brazil	São Paulo	Barra do Rio Guaraú
<i>P. frontalis</i>	MZUSP51310	F	Brazil	São Paulo	Barra do Rio Guaraú
<i>P. frontalis</i>	MZUSP51311	M	Brazil	São Paulo	Barra do Rio Guaraú
<i>P. frontalis</i>	MZUSP54408	M	Brazil	São Paulo	Barreiro Rico, Anhembi
<i>P. frontalis</i>	MZUSP54409	M	Brazil	São Paulo	Barreiro Rico, Anhembi
<i>P. frontalis</i>	MZUSP54410	M	Brazil	São Paulo	Barreiro Rico, Anhembi
<i>P. frontalis</i>	MZUSP54411	F	Brazil	São Paulo	Barreiro Rico, Anhembi
<i>P. frontalis</i>	MZUSP54812	M	Brazil	São Paulo	Estação Engenheiro Ferraz, sudoeste de SP
<i>P. frontalis</i>	MZUSP54813	M	Brazil	São Paulo	Estação Engenheiro Ferraz, sudoeste de SP
<i>P. frontalis</i>	MZUSP54814	F	Brazil	São Paulo	Estação Engenheiro Ferraz, sudoeste de SP
<i>P. frontalis</i>	MZUSP54815	M	Brazil	São Paulo	Estação Engenheiro Ferraz, sudoeste de SP
<i>P. frontalis</i>	MZUSP54816	F	Brazil	São Paulo	Estação Engenheiro Ferraz, sudoeste de SP
<i>P. frontalis</i>	MZUSP56415	F	Brazil	São Paulo	Estação Engenheiro Ferraz, sudoeste de SP
<i>P. frontalis</i>	MZUSP56416	M	Brazil	São Paulo	Estação Engenheiro Ferraz, sudoeste de SP
<i>P. frontalis</i>	MZUSP56417	M	Brazil	São Paulo	Estação Engenheiro Ferraz, sudoeste de SP
<i>P. frontalis</i>	MZUSP56418	F	Brazil	São Paulo	Estação Engenheiro Ferraz, sudoeste de SP
<i>P. frontalis</i>	MZUSP61396	F	Brazil	São Paulo	São Miguel
<i>P. frontalis</i>	MZUSP61527	M	Brazil	São Paulo	Quilombo, Serra de Santos
<i>P. frontalis</i>	MZUSP63036	M	Brazil	São Paulo	Pai Matias, litoral Sul
<i>P. frontalis</i>	MZUSP69424	M	Brazil	São Paulo	Barra do Icapará
<i>P. frontalis</i>	MZUSP71788	NA	Brazil	São Paulo	Icapara da Serra
<i>P. frontalis</i>	MZUSP73714	F	Brazil	São Paulo	Estação Ecológica Boracéia, Salesópolis
<i>P. frontalis</i>	MZUSP73715	F	Brazil	São Paulo	Estação Ecológica Boracéia, Salesópolis
<i>P. frontalis</i>	MZUSP78297	M	Brazil	São Paulo	Bananal, E.E.Bananal
<i>P. frontalis</i>	MZUSP78298	F	Brazil	São Paulo	Bananal, E.E.Bananal
<i>P. frontalis</i>	MZUSP83436	NA	Brazil	São Paulo	Vila Mariana, São Paulo
<i>P. frontalis</i>	MZUSP83437	NA	Brazil	São Paulo	Ilha Bela, São Sebastião
<i>P. frontalis</i>	MZUSP91842	M	Brazil	São Paulo	Rua das Margaridas, 460, Campos do Jordão
<i>P. frontalis</i>	MZUSP92439	NA	Brazil	São Paulo	Represa do Guarapiranga
<i>P. frontalis</i>	MZUSP92441	NA	Brazil	São Paulo	Parque Estadual da Serra do Mar, São Paulo, Núcleo Curucutu, Campos
<i>P. frontalis</i>	MZUSP92442	NA	Brazil	São Paulo	Parque Estadual da Serra do Mar, São Paulo, Núcleo Curucutu, Campos
<i>P. frontalis</i>	MZUSP92443	NA	Brazil	São Paulo	Parque Estadual da Serra do Mar, São Paulo, Núcleo Curucutu, Campos
<i>P. frontalis</i>	MZUSP92444	NA	Brazil	São Paulo	Parque Estadual da Serra do Mar, São Paulo, Núcleo Curucutu, Campos
<i>P. frontalis</i>	MZUSP7032	F	Brazil	Paraná	Faz. Monte Alegre
<i>P. frontalis</i>	MZUSP36747	F	Brazil	Paraná	R. Paracáí
<i>P. frontalis</i>	MZUSP36748	M	Brazil	Paraná	R. Paracáí
<i>P. frontalis</i>	MZUSP36749	M	Brazil	Paraná	R. Parana, Porto Camargo
<i>P. frontalis</i>	MZUSP36750	M	Brazil	Paraná	R. Parana, Porto Camargo
<i>P. frontalis</i>	MZUSP36751	M	Brazil	Paraná	R. Parana, Porto Camargo

<i>P. frontalis</i>	MZUSP36752	M	Brazil	Paraná	R. Parana, Porto Camargo
<i>P. frontalis</i>	MZUSP36753	F	Brazil	Paraná	R. Parana, Porto Camargo
<i>P. frontalis</i>	MZUSP36754	F	Brazil	Paraná	R. Parana, Porto Camargo
<i>P. frontalis</i>	MZUSP36755	F	Brazil	Paraná	R. Parana, Porto Camargo
<i>P. frontalis</i>	MZUSP36756	F	Brazil	Paraná	R. Parana, Porto Camargo
<i>P. frontalis</i>	MZUSP36757	F	Brazil	Paraná	R. Parana, Porto Camargo
<i>P. frontalis</i>	MZUSP36758	M	Brazil	Paraná	R. Parana, Porto Camargo
<i>P. frontalis</i>	MZUSP36759	M	Brazil	Paraná	R. Parana, Porto Camargo
<i>P. frontalis</i>	MZUSP36760	F	Brazil	Paraná	R. Parana, Porto Camargo
<i>P. frontalis</i>	MZUSP35458	F	Brazil	Santa Catarina	R. das Antas, Mun. de Caçador
<i>P. frontalis</i>	MZUSP35459	F	Brazil	Santa Catarina	R. das Antas, Mun. de Caçador
<i>P. frontalis</i>	MZUSP35460	M	Brazil	Santa Catarina	R. das Antas, Mun. de Caçador
<i>P. frontalis</i>	MZUSP35461	F	Brazil	Santa Catarina	R. das Antas, Mun. de Caçador
<i>P. frontalis</i>	MZUSP9100	M	Brazil	Rio Grande do Sul	NA
<i>P. frontalis</i>	MZUSP9101	F	Brazil	Rio Grande do Sul	NA
<i>P. frontalis</i>	MZUSP38640	M	Brazil	Rio Grande do Sul	Faz. Baios de Fora, 4o Distrito, Bom Jesus
<i>P. frontalis</i>	MZUSP41224	M	Brazil	Rio Grande do Sul	Mun. Bom Jesus
<i>P. frontalis</i>	MZUSP43654	F	Brazil	Rio Grande do Sul	Lajeado, Bom Jesus

2.2 Examined specimens selected as ingroup.

Species	Number	Sex	Country	State/Region	Locality
<i>A. auricapillus</i>	AMNH474277	M	Brazil	São Paulo	Faz. Cayoa, Salto Grande, Rio Paranapanema
<i>A. auricapillus</i>	AMNH139937	M	Brazil	Paraná	Faz. M. H.
<i>A. auricapillus</i>	AMNH316586	F	Brazil	Minas Gerais	Casa Queimada, Serra do Caparão
<i>A. auricapillus</i>	AMNH316585	F	Brazil	Minas Gerais	Casa Queimada, Serra do Caparão
<i>A. auricapillus</i>	AMNH474284	F	Brazil	Minas Gerais	Rio Jordao, Araguay
<i>A. auricapillus</i>	AMNH474285	F	Brazil	Minas Gerais	Rio Jordao, Araguay
<i>A. auricapillus</i>	AMNH474286	M	Brazil	NA	NA
<i>A. auricapillus</i>	AMNH241690	M	Brazil	Bahia	Cajazeiras
<i>A. auricapillus</i>	AMNH317289	F	Brazil	Espírito Santo	Lagoa Juparanã
<i>A. auricapillus</i>	AMNH474278	M	Brazil	NA	Rio das Cinzas
<i>A. auricapillus</i>	AMNH474281	NA	Brazil	Bahia	NA
<i>A. auricapillus</i>	ZMB10167	NA	Brazil	Bahia	NA
<i>A. auricapillus</i>	AMNH6209	NA	Brazil	NA	NA
<i>A. auricapillus</i>	AMNH308010	NA	Brazil	NA	NA
<i>A. auricapillus</i>	AMNH6210	NA	Brazil	NA	NA
<i>A. auricapillus</i>	AMNH308009	NA	Brazil	NA	NA
<i>A. auricapillus</i>	AMNH317282	M	Brazil	NA	NA
<i>A. auricapillus</i>	AMNH241691	M	Brazil	Bahia	Iracema
<i>A. auricapillus</i>	AMNH317288	F	Brazil	Espírito Santo	Lagoa Juparanã
<i>A. auricapillus</i>	AMNH170140	F	Brazil	Bahia	Verruga, Rio Pardo
<i>A. auricapillus</i>	AMNH474276	M	Brazil	São Paulo	Faz. Cayoa, Salto Grande, Rio Paranapanema

<i>A. auricapillus</i>	AMNH474282	NA	Brazil	Espírito Santo	Lagoa Juparanã
<i>A. auricapillus</i>	AMNH241688	M	Brazil	Bahia	Cajazeiras
<i>A. auricapillus</i>	AMNH241689	F	Brazil	Bahia	Cajazeiras
<i>A. auricapillus</i>	AMNH474283	M	Brazil	NA	Rio Jordao, Araguary
<i>A. auricapillus</i>	AMNH474279	M	Brazil	Bahia	NA
<i>A. auricapillus</i>	AMNH474280	NA	Brazil	Bahia	NA
<i>A. auricapillus</i>	AMNH44716	NA	Brazil	Bahia	NA
<i>A. auricapillus</i>	MZUSP14011	M	Brazil	Bahia	R. Gongogi, confl. Rio Novo
<i>A. auricapillus</i>	MZUSP14012	M	Brazil	Bahia	R. Gongogi, confl. Rio Novo
<i>A. auricapillus</i>	MZUSP14013	F	Brazil	Bahia	R. Gongogi, confl. Rio Novo
<i>A. auricapillus</i>	MZUSP90903	NA	Brazil	Bahia	RPPN Serra Bonita, Camacan
<i>A. auricapillus</i>	MZUSP14885	M	Brazil	Goiás	Faz. Thomé Pinto, Jaragua, Rio das Almas
<i>A. auricapillus</i>	MZUSP26716	F	Brazil	Goiás	Faz. Transvaal, Municipio de Rio Verde
<i>A. auricapillus</i>	MZUSP33033	F	Brazil	Goiás	Caldas Novas
<i>A. auricapillus</i>	MZUSP51815	F	Brazil	Goiás	Goiânia
<i>A. auricapillus</i>	MZUSP52364	M	Brazil	Goiás	Goiânia
<i>A. auricapillus</i>	MZUSP65087	F	Brazil	Goiás	Goiânia
<i>A. auricapillus</i>	MZUSP24505	F	Brazil	Minas Gerais	R. Doce, baixo Piracicaba (margem direita)
<i>A. auricapillus</i>	MZUSP24506	M	Brazil	Minas Gerais	R. Doce, baixo Suassuhy
<i>A. auricapillus</i>	MZUSP24507	M	Brazil	Minas Gerais	R. Doce, barra do Suassuhy
<i>A. auricapillus</i>	MZUSP24818	M	Brazil	Minas Gerais	R. Doce, baixo Piracicaba (margem direita)
<i>A. auricapillus</i>	MZUSP82703	NA	Brazil	Minas Gerais	Itacarambi, Volta da Serra
<i>A. auricapillus</i>	MZUSP82704	NA	Brazil	Minas Gerais	Itacarambi, Volta da Serra
<i>A. auricapillus</i>	MZUSP82705	NA	Brazil	Minas Gerais	Itacarambi, Volta da Serra
<i>A. auricapillus</i>	MZUSP82706	NA	Brazil	Minas Gerais	Itacarambi, Volta da Serra
<i>A. auricapillus</i>	MZUSP28108	M	Brazil	Espírito Santo	R. São José
<i>A. auricapillus</i>	MZUSP28109	F	Brazil	Espírito Santo	R. São José
<i>A. auricapillus</i>	MZUSP28110	F	Brazil	Espírito Santo	R. São José
<i>A. auricapillus</i>	MZUSP34487	M	Brazil	Espírito Santo	R. Itaúnas
<i>A. auricapillus</i>	MZUSP34490	M	Brazil	Espírito Santo	R. Itaúnas
<i>A. auricapillus</i>	MZUSP794	F	Brazil	São Paulo	Caconde
<i>A. auricapillus</i>	MZUSP4490	F	Brazil	São Paulo	Avanhandava
<i>A. auricapillus</i>	MZUSP4491	M	Brazil	São Paulo	Avanhandava
<i>A. auricapillus</i>	MZUSP8144	F	Brazil	São Paulo	Ituverava
<i>A. auricapillus</i>	MZUSP8145	F	Brazil	São Paulo	Ituverava
<i>A. auricapillus</i>	MZUSP12489	F	Brazil	São Paulo	ValParaíso
<i>A. auricapillus</i>	MZUSP12492	M	Brazil	São Paulo	ValParaíso
<i>A. auricapillus</i>	MZUSP12493	M	Brazil	São Paulo	ValParaíso
<i>A. auricapillus</i>	MZUSP12789	F	Brazil	São Paulo	Faz. Boas Vista, Silvânia
<i>A. auricapillus</i>	MZUSP26714	F	Brazil	São Paulo	Faz. Varjão, Lins
<i>A. auricapillus</i>	MZUSP26715	M	Brazil	São Paulo	Faz. Varjão, Lins
<i>A. auricapillus</i>	MZUSP29091	F	Brazil	São Paulo	Faz. São Miguel, Cajuru
<i>A. auricapillus</i>	MZUSP29283	M	Brazil	São Paulo	Faz. Palmira, Assis, Rio Parapanema

<i>A. auricapillus</i>	MZUSP29284	F	Brazil	São Paulo	Corredeira das Flores, Assis, Rio Paranapanema
<i>A. auricapillus</i>	MZUSP31251	F	Brazil	São Paulo	R. Paranapanema, Barra Tibagi
<i>A. auricapillus</i>	MZUSP31252	F	Brazil	São Paulo	R. Paranapanema, Porto Marcondes
<i>A. auricapillus</i>	MZUSP31461	M	Brazil	São Paulo	Faz. Três Barras, Pitangueiras
<i>A. auricapillus</i>	MZUSP31462	F	Brazil	São Paulo	Faz. Três Barras, Pitangueiras
<i>A. auricapillus</i>	MZUSP31463	M	Brazil	São Paulo	Faz. Três Barras, Pitangueiras
<i>A. auricapillus</i>	MZUSP31464	F	Brazil	São Paulo	Faz. Três Barras, Pitangueiras
<i>A. auricapillus</i>	MZUSP31465	M	Brazil	São Paulo	Faz. Três Barras, Pitangueiras
<i>A. auricapillus</i>	MZUSP31466	F	Brazil	São Paulo	Faz. Três Barras, Pitangueiras
<i>A. auricapillus</i>	MZUSP31467	M	Brazil	São Paulo	Faz. Três Barras, Pitangueiras
<i>A. auricapillus</i>	MZUSP1809	NA	Brazil	Paraná	Jacarezinho
<i>A. auricapillus</i>	MZUSP7028	F	Brazil	Paraná	Faz. Monte alegre
<i>A. auricapillus</i>	MZUSP7029	F	Brazil	Paraná	Faz. Monte Alegre
<i>A. auricapillus</i>	MZUSP7030	M	Brazil	Paraná	Faz. Monte Alegre
<i>A. auricapillus</i>	USNM115222	NA	Brazil	Bahia	NA
<i>A. auricapillus</i>	USNM177633	F	Brazil	Paraná	Jacarezinho
<i>A. auricapillus</i>	USNM257956	F	Brazil	NA	NA
<i>A. auricapillus</i>	USNM115221	NA	Brazil	Bahia	NA
<i>A. auricapillus</i>	LSUMZ65120	F	Brazil	Minas Gerais	Dom Joaquim
<i>A. auricapillus</i>	LSUMZ65122	F	Brazil	Minas Gerais	Dom Joaquim
<i>A. auricapillus</i>	LSUMZ65121	M	Brazil	Minas Gerais	Dom Joaquim
<i>A. auricapillus</i>	LSUMZ65123	M	Brazil	São Paulo	Adolfo
<i>A. auricapillus</i>	LSUMZ43733	M	Brazil	captivity	NA
<i>A. auricapillus</i>	FMNH46976	F	Brazil	Bahia	Macaco Secco
<i>A. auricapillus</i>	FMNH46977	M	Brazil	Bahia	Macaco Secco
<i>A. auricapillus</i>	FMNH191632	M	Brazil	Minas Gerais	Raul Soares
<i>A. auricapillus</i>	FMNH191633	M	Brazil	Minas Gerais	Raul Soares
<i>A. auricapillus</i>	FMNH191634	M	Brazil	Minas Gerais	Raul Soares
<i>A. auricapillus</i>	FMNH123349	M	Brazil	São Paulo	Município de Luis, Faz. Varjão
<i>A. auricapillus</i>	FMNH123346	F	Brazil	São Paulo	Município de Luis, Faz. Varjão
<i>A. auricapillus</i>	FMNH123348	F	Brazil	São Paulo	Município de Luis, Faz. Varjão
<i>A. auricapillus</i>	FMNH123347	M	Brazil	São Paulo	Município de Luis, Faz. Varjão
<i>A. auricapillus</i>	FMNH73662	F	Brazil	Paraná	Rio Baile
<i>A. auricapillus</i>	BMNH90.6.1.50	JUV	Brazil	NA	South East
<i>A. auricapillus</i>	BMNH95.4.1.425	M	Brazil	Rio de Janeiro	NA
<i>A. auricapillus</i>	BMNH95.4.1.426	F	Brazil	Rio de Janeiro	NA
<i>A. auricapillus</i>	BMNH89.1.30.90	M	Brazil	Rio Grande do Sul	Pelotas
<i>A. auricapillus</i>	BMNH89.1.30.84	NA	Brazil	Bahia	NA
<i>A. auricapillus</i>	BMNH89.1.30.89	NA	Brazil	Bahia	NA
<i>A. auricapillus</i>	BMNH90.4.1.22	M	captivity	London	NA

<i>A. auricapillus</i>	BMNH89.1.30.88	NA	Brazil	Bahia	NA
<i>A. auricapillus</i>	BMNH90.6.1.49	NA	Brazil	Bahia	NA
<i>A. auricapillus</i>	BMNH82.1.10.22	NA	Brazil	NA	Upper Amazons
<i>A. auricapillus</i>	BMNH89.1.30.490	NA	Brazil	NA	NA
<i>A. auricapillus</i>	BMNH82.1.10.21	NA	Brazil	NA	Upper Amazons
<i>A. auricapillus</i>	MNHN470	M	Brazil	Goiás	Campo limpo
<i>A. auricapillus</i>	MNHN490	F	Brazil	NA	NA
<i>A. auricapillus</i>	MNHN443	F	Brazil	Goiás	Goiânia
<i>A. auricapillus</i>	MNHN442	F	Brazil	Goiás	Trinidad
<i>A. jandaya</i>	AMNH474257	M	Brazil	Maranhão	Primeira Cruz
<i>A. jandaya</i>	AMNH241686	NA	Brazil	Piauí	Corrente
<i>A. jandaya</i>	AMNH241683	M	Brazil	Piauí	Corrente
<i>A. jandaya</i>	AMNH241684	F	Brazil	Piauí	Corrente
<i>A. jandaya</i>	AMNH241685	F	Brazil	Piauí	Corrente
<i>A. jandaya</i>	AMNH421679	M	Brazil	Maranhão	Tabocas
<i>A. jandaya</i>	AMNH448113	M	captivity	New York	Central Park Zoo
<i>A. jandaya</i>	AMNH241687	M	Brazil	Maranhão	São Paulo, Benedito Leite
<i>A. jandaya</i>	AMNH241682	M	Brazil	Piauí	Corrente
<i>A. jandaya</i>	AMNH474261	F	Brazil	Piauí	S. Martin
<i>A. jandaya</i>	AMNH241680	F	Brazil	Maranhão	Tabocas
<i>A. jandaya</i>	AMNH61399	M	captivity	New York	Central park Zoo
<i>A. jandaya</i>	AMNH241681	M	Brazil	Piauí	Corrente
<i>A. jandaya</i>	AMNH174596	F	Brazil	NA	Fazenda do Saco
<i>A. jandaya</i>	AMNH474262	NA	captivity	England	Tring
<i>A. jandaya</i>	AMNH474256	M	Brazil	Maranhão	Primeira Cruz
<i>A. jandaya</i>	AMNH474258	F	Brazil	Maranhão	Primeira Cruz
<i>A. jandaya</i>	AMNH448112	M	captivity	New York	Central park Zoo
<i>A. jandaya</i>	AMNH474264	M	NA	NA	NA
<i>A. jandaya</i>	AMNH174595	M	NA	NA	NA
<i>A. jandaya</i>	AMNH241678	F	Brazil	Maranhão	Pastos Bons
<i>A. jandaya</i>	AMNH474263	NA	Brazil	NA	NA
<i>A. jandaya</i>	MZUSP52356	M	Brazil	Tocantins	Araguatins
<i>A. jandaya</i>	MZUSP52357	M	Brazil	Tocantins	Araguatins
<i>A. jandaya</i>	MZUSP52358	M	Brazil	Tocantins	Araguatins
<i>A. jandaya</i>	MZUSP52359	M	Brazil	Tocantins	Araguatins
<i>A. jandaya</i>	MZUSP52360	M	Brazil	Tocantins	Araguatins
<i>A. jandaya</i>	MZUSP52361	M	Brazil	Tocantins	Araguatins
<i>A. jandaya</i>	MZUSP52362	F	Brazil	Tocantins	Araguatins
<i>A. jandaya</i>	MZUSP52363	M	Brazil	Tocantins	Araguatins
<i>A. jandaya</i>	MZUSP6642	F	Brazil	Maranhão	Primeira Cruz
<i>A. jandaya</i>	MZUSP38132	M	Brazil	Maranhão	Barra do Corda
<i>A. jandaya</i>	MZUSP81185	F	Brazil	Maranhão	Araguanã
<i>A. jandaya</i>	MZUSP4332	M	Brazil	Piauí	R. Parnaíba
<i>A. jandaya</i>	MZUSP4333	F	Brazil	Piauí	R. Parnaíba
<i>A. jandaya</i>	MZUSP41494	M	Brazil	Ceará	Icarai, Mosquito
<i>A. jandaya</i>	MZUSP41495	M	Brazil	Ceará	Icarai, Mosquito

<i>A. jandaya</i>	MZUSP41496	F	Brazil	Ceará	Icarai, Mosquito
<i>A. jandaya</i>	MZUSP41497	F	Brazil	Ceará	Icarai, Mosquito
<i>A. jandaya</i>	MZUSP41498	F	Brazil	Ceará	Icarai, Mosquito
<i>A. jandaya</i>	MZUSP41499	F	Brazil	Ceará	Icarai, Mosquito
<i>A. jandaya</i>	MZUSP41500	F	Brazil	Ceará	Icarai, Mosquito
<i>A. jandaya</i>	MZUSP37234	M	Brazil	Alagoas	Mangabeiras, Usina Sinimbu
<i>A. jandaya</i>	MZUSP37235	F	Brazil	Alagoas	Mangabeiras, Usina Sinimbu
<i>A. jandaya</i>	MZUSP15750	M	Brazil	Goiás	Barra do Rio São Domingos
<i>A. jandaya</i>	MZUSP15751	M	Brazil	Goiás	Cana Brava, Nova Roma
<i>A. jandaya</i>	MZUSP15752	F	Brazil	Goiás	Barra do Rio São Domingos
<i>A. jandaya</i>	USNM334361	M	captivity	NA	NA
<i>A. jandaya</i>	USNM487518	F	captivity	NA	NA
<i>A. jandaya</i>	USNM124788	NA	NA	NA	NA
<i>A. jandaya</i>	LSUMZ32251	F	Brazil	Goiás	Araguatins
<i>A. jandaya</i>	FMNH62871	M	Brazil	Maranhão	Tranquiera
<i>A. jandaya</i>	FMNH355158	F JUV	captivity	Kansas	Busch Gardens
<i>A. jandaya</i>	FMNH50104	F	Brazil	Maranhão	Primerio Cruz
<i>A. jandaya</i>	FMNH344303	M	Brazil	Goiás	Araguatins
<i>A. jandaya</i>	FMNH75210	F	Brazil	Goiás	Nova Roma
<i>A. jandaya</i>	FMNH62869	M	Brazil	Maranhão	Grajahu
<i>A. jandaya</i>	FMNH62872	F JUV	Brazil	Maranhão	Tranquiera
<i>A. jandaya</i>	FMNH62868	M	Brazil	Maranhão	Tury-assu
<i>A. jandaya</i>	FMNH62867	F	Brazil	Maranhão	Tury-assu
<i>A. jandaya</i>	FMNH62870	M	Brazil	Maranhão	Tranquiera
<i>A. jandaya</i>	BMNH1913.3.14.43	M	Brazil	Maranhão	Miritiba
<i>A. jandaya</i>	BMNH1913.3.14.45	F	Brazil	Maranhão	Miritiba
<i>A. jandaya</i>	BMNH90.6.1.47	M	Brazil	NA	NA
<i>A. jandaya</i>	BMNH90.6.1.46	NA	Brazil	Pernambuco	NA
<i>A. jandaya</i>	BMNH1913.3.14.42	M	Brazil	Maranhão	Miritiba
<i>A. jandaya</i>	BMNH55.12.19.282	NA	captivity	London	NA
<i>A. jandaya</i>	BMNH1913.3.14.44	M	Brazil	Maranhão	Miritiba
<i>A. jandaya</i>	BMNH1994.8.8	NA	NA	NA	NA
<i>A. jandaya</i>	MNHN1163	NA	Brazil	NE	NA
<i>A. jandaya</i>	MNHN413	M	Brazil	S	NA
<i>A. jandaya</i>	MNHN563	F	Brazil	NA	NA
<i>A. jandaya</i>	MNHN666	M	Brazil	NA	NA
<i>A. maculata</i>	MZUSP10644	M	Brazil	Pará	Santarém
<i>A. maculata</i>	MZUSP18451	F	Brazil	Pará	Foz do Rio Tapajós
<i>A. maculata</i>	AMNH474275	F	Brazil	Pará	Rio Maycuru
<i>A. maculata</i>	AMNH474259	M	Brazil	Pará	Rio Maycuru
<i>A. maculata</i>	AMNH72028	F	Brazil	NA	NA
<i>A. maculata</i>	AMNH474260	M	Brazil	Pará	Rio Maycuru
<i>A. maculata</i>	MZUSP75746	F	Brazil	Pará	Monte Alegre, Colonia do

					Ereré
<i>A. maculata</i>	MZUSP75749	F	Brazil	Pará	Monte Alegre, Colonia do Ereré
<i>A. maculata</i>	MZUSP75748	M	Brazil	Pará	Monte Alegre, Colonia do Ereré
<i>A. maculata</i>	MZUSP75747	M	Brazil	Pará	Monte Alegre, Colonia do Ereré
<i>A. maculata</i>	MZUSP75750	M	Brazil	Pará	Monte Alegre, Colonia do Ereré
<i>A. maculata</i>	FMNH69125	M	Brazil	Pará	Rio Maycuri
<i>A. solstitialis</i>	AMNH6207	NA	Brazil	NA	NA
<i>A. solstitialis</i>	AMNH6205	NA	Brazil	NA	NA
<i>A. solstitialis</i>	AMNH474266	M	British Guiana	NA	Quonga
<i>A. solstitialis</i>	AMNH474271	M JUV	British Guiana	NA	NA
<i>A. solstitialis</i>	AMNH474268	M JUV	British Guiana	NA	NA
<i>A. solstitialis</i>	AMNH474270	M	British Guiana	NA	NA
<i>A. solstitialis</i>	AMNH474267	F	British Guiana	NA	Quonga
<i>A. solstitialis</i>	AMNH474274	NA	British Guiana	NA	NA
<i>A. solstitialis</i>	AMNH474265	M	British Guiana	NA	Annai
<i>A. solstitialis</i>	AMNH474269	F JUV	British Guiana	NA	NA
<i>A. solstitialis</i>	MZUSP77939	M	Brazil	Roraima	Boqueirão do Cristal
<i>A. solstitialis</i>	MZUSP77940	F	Brazil	Roraima	Boqueirão do Cristal
<i>A. solstitialis</i>	MZUSP6490	NA	British Guiana	NA	NA
<i>A. solstitialis</i>	USNM614252	M	captivity	NA	NA
<i>A. solstitialis</i>	USNM612805	M	captivity	NA	NA
<i>A. solstitialis</i>	USNM623405	M	captivity	NA	NA
<i>A. solstitialis</i>	USNM145674	M	British Guiana	NA	Quonga
<i>A. solstitialis</i>	USNM145673	M	British Guiana	NA	Quonga
<i>A. solstitialis</i>	USNM124711	F	British Guiana	NA	Quonga
<i>A. solstitialis</i>	USNM145675	M	British Guiana	NA	Quonga
<i>A. solstitialis</i>	FMNH48999	M	British Guiana	NA	NA
<i>A. solstitialis</i>	BMNH92.1.16.52	F	British Guiana	NA	Quonga
<i>A. solstitialis</i>	BMNH92.1.16.54	M	British Guiana	NA	Quonga
<i>A. solstitialis</i>	BMNH90.6.1.45	F	Brazil	NA	Rio Mahu
<i>A. solstitialis</i>	BMNH1922.3.5.4628	NA	British Guiana	NA	NA
<i>A. solstitialis</i>	BMNH92.1.16.51	M	British Guiana	NA	Quonga
<i>A. solstitialis</i>	BMNH	JUV	NA	NA	NA
<i>A. solstitialis</i>	BMNH95.11.28.137	F	British Guiana	NA	NA
<i>A. solstitialis</i>	BMNH92.1.16.60	JUV	British Guiana	NA	Quonga
<i>A. solstitialis</i>	BMNH92.1.16.59	JUV	British Guiana	NA	Quonga
<i>A. solstitialis</i>	BMNH92.1.16.58	JUV	British Guiana	NA	Quonga

<i>A. solstitialis</i>	MNHN465	M	British Guiana	NA	Quonga
<i>A. solstitialis</i>	MNHN466	M	British Guiana	NA	Quonga
<i>A. solstitialis</i>	MNHN472	M	British Guiana	NA	Quonga
<i>A. solstitialis</i>	MNHN470	M	British Guiana	NA	Quonga
<i>A. solstitialis</i>	MNHN479	M	British Guiana	NA	Quonga
<i>A. solstitialis</i>	MNHN473	M	British Guiana	NA	Quonga
<i>A. weddellii</i>	AMNH474296	NA	Brazil	Amazonas, Rio Madeira	Humaytha
<i>A. weddellii</i>	AMNH239805	NA	Peru	Alto Ucayali	Santa Rosa
<i>A. weddellii</i>	AMNH239802	NA	Peru	NA	Bira, Rio Uruamba
<i>A. weddellii</i>	AMNH127338	F	Brazil	NA	Calama, Rio Madeira
<i>A. weddellii</i>	AMNH237720	NA	Peru	Loreto	Rio Ucayali
<i>A. weddellii</i>	AMNH791766	F	Bolivia	Dpto. Beni	8 km N of Santa Cruz, Rio Mamoré
<i>A. weddellii</i>	AMNH474305	F	Bolivia	Santa Cruz	Province of Sara
<i>A. weddellii</i>	AMNH791768	M	Bolivia	Dpto. Beni	8 km N of Santa Cruz, Rio Mamoré
<i>A. weddellii</i>	AMNH230865	NA	Brazil	Apayacu	Rio Amazonas
<i>A. weddellii</i>	AMNH239804	NA	Peru	Alto Ucayali	Santa Rosa
<i>A. weddellii</i>	AMNH819667	F	Peru	Luisiana	Rio Apurimac, 600 m
<i>A. weddellii</i>	AMNH819594	M	Peru	Luisiana	Rio Apurimac, 600 m
<i>A. weddellii</i>	AMNH230861	NA	Peru	Apayacu	Rio Amazonas
<i>A. weddellii</i>	AMNH230862	NA	Peru	Apayacu	Rio Amazonas
<i>A. weddellii</i>	AMNH239807	NA	Peru	Alto Ucayali	Santa Rosa
<i>A. weddellii</i>	AMNH239803	NA	Peru	Alto Ucayali	Santa Rosa
<i>A. weddellii</i>	AMNH255138	NA	Ecuador	Pastaza	Rio Curaray
<i>A. weddellii</i>	AMNH474303	F	Bolivia	NA	Province of Sara
<i>A. weddellii</i>	AMNH239806	NA	Peru	NA	Santa Rosa
<i>A. weddellii</i>	AMNH474301	M	Bolivia	NA	Province of Sara
<i>A. weddellii</i>	AMNH136888	M	Bolivia	Cochabamba	Todos Santos, 1300 feet
<i>A. weddellii</i>	AMNH136890	M	Bolivia	Cochabamba	Todos Santos, 1300 feet
<i>A. weddellii</i>	AMNH791767	M	Bolivia	Beni	8 km N of Santa Cruz, Rio Mamoré
<i>A. weddellii</i>	AMNH237719	NA	Peru	NA	Rio Ucayali
<i>A. weddellii</i>	AMNH474302	M	Bolivia	NA	Province of Sara
<i>A. weddellii</i>	AMNH136891	F	Bolivia	Cochabamba	Todos Santos, 1300 feet
<i>A. weddellii</i>	AMNH474306	NA	Ecuador	NA	Napo
<i>A. weddellii</i>	AMNH819199	M	Bolivia	Beni	pampas del Rio Ubaré ?, 24 km de la boca
<i>A. weddellii</i>	AMNH181784	M	Peru	Luisiana	Rio Apurimac, Dpto. Cuzco, 1900 feet
<i>A. weddellii</i>	AMNH44710	NA	Ecuador	NA	Napo
<i>A. weddellii</i>	AMNH406876	F	NA	NA	Rio Santiago
<i>A. weddellii</i>	AMNH406877	F	NA	NA	Rio Santiago
<i>A. weddellii</i>	AMNH791769	F	Bolivia	NA	Beni
<i>A. weddellii</i>	AMNH474300	F	Brazil	Rondonia	St. Isabel, Rio Preto, Rio Madeira
<i>A. weddellii</i>	AMNH474304	F	Bolivia	NA	Province of Sara

<i>A. weddellii</i>	AMNH127339	M	Brazil	Mato Grosso	Tapirapoan, Siputuba River
<i>A. weddellii</i>	AMNH474297	F	Brazil	NA	Rio Madeira
<i>A. weddellii</i>	AMNH474298	M	Brazil	NA	Calama, Rio Madeira
<i>A. weddellii</i>	AMNH230859	NA	Brazil	NA	Porto Indiano, Rio Amazonas
<i>A. weddellii</i>	AMNH474299	F	Brazil	NA	Jamarizinho, Rio Machados, confl. Of Rio Madeiras
<i>A. weddellii</i>	AMNH136889	M	Bolivia	Cochabamba	Todos Santos, 1300 feet
<i>A. weddellii</i>	MZUSP16262	M	Brazil	Amazonas	R. Juruá, João Pessoa
<i>A. weddellii</i>	MZUSP16263	F	Brazil	Amazonas	R. Juruá, João Pessoa
<i>A. weddellii</i>	MZUSP20525	F	Brazil	Amazonas	R. Juruá, João Pessoa
<i>A. weddellii</i>	MZUSP20831	F	Brazil	Amazonas	R. Juruá, João Pessoa
<i>A. weddellii</i>	MZUSP21299	M	Brazil	Amazonas	R. Juruá, João Pessoa
<i>A. weddellii</i>	MZUSP21788	M	Brazil	Amazonas	R. Juruá, João Pessoa
<i>A. weddellii</i>	MZUSP23944	M	Brazil	Amazonas	R. Juruá, João Pessoa
<i>A. weddellii</i>	MZUSP35592	M	Brazil	Acre	Iquiri
<i>A. weddellii</i>	MZUSP35593	M	Brazil	Acre	Iquiri
<i>A. weddellii</i>	MZUSP35594	F	Brazil	Acre	Iquiri
<i>A. weddellii</i>	MZUSP35595	M	Brazil	Acre	Iquiri
<i>A. weddellii</i>	MZUSP35596	M	Brazil	Acre	Iquiri
<i>A. weddellii</i>	MZUSP35597	M	Brazil	Acre	Iquiri
<i>A. weddellii</i>	MZUSP35598	M	Brazil	Acre	Vila Plácido de Castro, Rio Abunã
<i>A. weddellii</i>	MZUSP72261	M	Brazil	Acre	Faz. Campo Lindo, Rio Branco
<i>A. weddellii</i>	MZUSP76371	F	Brazil	Acre	Rio Macauã
<i>A. weddellii</i>	MZUSP76372	M	Brazil	Acre	Rio Macauã
<i>A. weddellii</i>	MZUSP76373	M	Brazil	Acre	Rio Macauã
<i>A. weddellii</i>	MZUSP37924	M	Brazil	Rondônia	Porto Velho, alto Madeira - Guaporé
<i>A. weddellii</i>	MZUSP37925	M	Brazil	Rondônia	Porto Velho (Rodovia km 8)- alto Madeira - Guaporé
<i>A. weddellii</i>	MZUSP65919	F	Brazil	Rondônia	R. Anari
<i>A. weddellii</i>	MZUSP78047	M	Brazil	Mato Grosso	Pontes e lacerda
<i>A. weddellii</i>	MZUSP2271	M	Bolivia	San Matheo	NA
<i>A. weddellii</i>	MZUSP64911	F	Peru	Pucallpa	NA
<i>A. weddellii</i>	USNM55316	NA	Peru	NA	NA
<i>A. weddellii</i>	USNM16555	NA	Colombia	NA	Bogota
<i>A. weddellii</i>	USNM310547	F	Bolivia	NA	NA
<i>A. weddellii</i>	USNM485496	NA	captivity	NA	NA
<i>A. weddellii</i>	USNM325795	F	captivity	NA	NA
<i>A. weddellii</i>	LSUMZ70494	F	Ecuador	Napo	Limoncocha
<i>A. weddellii</i>	LSUMZ33993	F	Peru	Amazonas	Rio Nieva, Kigkis
<i>A. weddellii</i>	LSUMZ119292	M	Peru	Loreto	Isla Correviento, Rio Amazonas SE Oran, ca 85 km NE Iquitos, 80 m
<i>A. weddellii</i>	LSUMZ170684	M	Peru	Loreto	86 km SE Juangui on E bank upper Rio Panya
<i>A. weddellii</i>	LSUMZ170685	F	Peru	Loreto	ca 86 km SE Juanjui on E bank of upper Rio Panya

<i>A. weddellii</i>	LSUMZ131965	F	Bolivia	Pando	Prov. Nicolas Suarez, 12 km by road Cobija 8 km W on road to Mucden
<i>A. weddellii</i>	LSUMZ131963	F	Bolivia	Pando	Prov. Nicolas Suarez, 12 km by road Cobija 8 km W on road to Mucden
<i>A. weddellii</i>	LSUMZ131962	F	Bolivia	Pando	Prov. Nicolas Suarez, 12 km by road Cobija 8 km W on road to Mucden
<i>A. weddellii</i>	LSUMZ131966	M	Bolivia	Pando	Prov. Nicolas Suarez, 12 km by road Cobija 8 km W on road to Mucden
<i>A. weddellii</i>	LSUMZ131967	M	Bolivia	Pando	Prov. Nicolas Suarez, 12 km by road Cobija 8 km W on road to Mucden
<i>A. weddellii</i>	FMNH251547	F	Peru	Cuzco	Hda. Villacarmen
<i>A. weddellii</i>	FMNH227881	M	Peru	Madre de Dios	Zona Boca Colorado
<i>A. weddellii</i>	FMNH222882	M	Peru	Cuzco	Cosñipata, Hda. Villa Carmen
<i>A. weddellii</i>	FMNH251548	M	Peru	Cuzco	Hda. Villacarmen
<i>A. weddellii</i>	FMNH185555	F	Peru	Yarinacocha, Rio Ucayali	Loreto
<i>A. weddellii</i>	FMNH153738	M	Peru	Yarinacocha, Rio Ucayali	Loreto
<i>A. weddellii</i>	FMNH275609	M	Peru	Yarinacocha	Loreto
<i>A. weddellii</i>	FMNH153739	M	Peru	Yarinacocha, Rio Ucayali	NA
<i>A. weddellii</i>	FMNH251546	F	Peru	Cuzco	Hda. Villacarmen
<i>A. weddellii</i>	FMNH251541	F	Peru	Madre de Dios	Rio Tambopata, Collpa
<i>A. weddellii</i>	BMNH89.1.30.93	M	Peru	NA	Elvira
<i>A. weddellii</i>	BMNH89.1.30.94	F	Peru	NA	Elvira
<i>A. weddellii</i>	BMNH89.1.30.95	NA	Ecuador	Pastaza	Sarayacu
<i>A. weddellii</i>	BMNH89.1.30.96	NA	Ecuador	Pastaza	Sarayacu
<i>A. weddellii</i>	BMNH90.6.1.51	NA	Brazil	Pernambuco	NA
<i>A. weddellii</i>	BMNH46.9.9.39	NA	Bolivia	NA	NA
<i>A. weddellii</i>	BMNH89.1.30.92	M	Brazil	NA	Eng. Do Gama
<i>A. weddellii</i>	BMNH90.6.1.52	NA	Brazil	NA	Eng. Do Gama
<i>A. weddellii</i>	MNHN528	M	Peru	NA	Pucallpa
<i>A. weddellii</i>	MNHN454	NA	Ecuador	NA	NA
<i>A. weddellii</i>	MNHN926	F	Ecuador	NA	Quito
<i>A. weddellii</i>	MNHN3404	M	Peru	NA	Pucallpa
<i>A. weddellii</i>	MNHN2004_133	NA	NA	NA	NA
<i>A. weddellii</i>	MNHN925	M	Ecuador	NA	NA
<i>A. nenday</i>	UMMZ93297	M	Paraguay	NA	Puerto Casado
<i>A. nenday</i>	AMNH748681	F	Paraguay	NA	NA
<i>A. nenday</i>	AMNH320769	NA	Paraguay	NA	Chaco, front of Concepcion, 500 feet
<i>A. nenday</i>	AMNH149395	M	Brazil	Mato Grosso	Descalvados
<i>A. nenday</i>	AMNH320766	F	Paraguay	NA	Chaco, front of Concepcion, 500 feet
<i>A. nenday</i>	AMNH474291	NA	Argentina	NA	Gran Chaco
<i>A. nenday</i>	AMNH129291	F	captivity	NA	N.Y. Zoological Society

<i>A. nenday</i>	AMNH474287	NA	Argentina	NA	Chaco Austral. Rio de Oro
<i>A. nenday</i>	AMNH320767	F	Paraguay	NA	Chaco, front of Concepcion, 500 feet
<i>A. nenday</i>	AMNH474289	NA	Argentina	NA	Chaco Austral. Rio de Oro
<i>A. nenday</i>	AMNH474294	NA	NA	NA	NA
<i>A. nenday</i>	AMNH474290	NA	Argentina	NA	Kolonie Alfonso. Formosa. Gran Chaco.
<i>A. nenday</i>	AMNH474288	NA	Argentina	NA	Chaco Austral. Rio de Oro
<i>A. nenday</i>	AMNH300587	M	captivity	NA	cage bird
<i>A. nenday</i>	AMNH474293	NA	Paraguay	NA	NA
<i>A. nenday</i>	AMNH474292	NA	Paraguay	NA	NA
<i>A. nenday</i>	AMNH320768	NA	Paraguay	NA	Chaco, front of Concepcion, 500 feet
<i>A. nenday</i>	AMNH149397	M	Paraguay	NA	Fort Wheeler. Paraguayan Chaco
<i>A. nenday</i>	AMNH320770	NA	NA	NA	NA
<i>A. nenday</i>	AMNH748684	F	NA	NA	NA
<i>A. nenday</i>	AMNH474295	NA	Paraguay	NA	NA
<i>A. nenday</i>	MZUSP12239	M	Brazil	Mato Grosso do Sul	Porto Esperança
<i>A. nenday</i>	MZUSP12296	M	Brazil	Mato Grosso do Sul	Porto Esperança
<i>A. nenday</i>	MZUSP12325	F	Brazil	Mato Grosso do Sul	Porto Esperança
<i>A. nenday</i>	MZUSP18279	F	Brazil	Mato Grosso do Sul	Salobra
<i>A. nenday</i>	MZUSP81199	F	Brazil	Mato Grosso do Sul	Faz. Caiman, Miranda
<i>A. nenday</i>	MZUSP42861	F	Brazil	São Paulo	Faz. Sta. Ernestina, Taquaratinga
<i>A. nenday</i>	MZUSP2113	NA	Paraguay	NA	NA
<i>A. nenday</i>	USNM145676	NA	Paraguay	NA	NA
<i>A. nenday</i>	USNM283748	M	Paraguay	NA	Puerto Pinasco
<i>A. nenday</i>	USNM311893	M	captivity	Natural Zoological Park	NA
<i>A. nenday</i>	USNM16410	NA	Brazil	NA	NA
<i>A. nenday</i>	USNM283749	M	Paraguay	NA	Puerto Pinasco
<i>A. nenday</i>	USNM399457	M	NA	NA	NA
<i>A. nenday</i>	USNM399456	F	NA	NA	NA
<i>A. nenday</i>	USNM127073	NA	Paraguay	NA	NA
<i>A. nenday</i>	LSUMZ73255	M	Argentina	Formosa	Espinillo
<i>A. nenday</i>	LSUMZ73253	M	Argentina	Formosa	Espinillo
<i>A. nenday</i>	LSUMZ73254	M	Argentina	Formosa	Espinillo
<i>A. nenday</i>	LSUMZ73252	M	Argentina	Formosa	Espinillo
<i>A. nenday</i>	FMNH152837	M	Paraguay	Chaco	Puerto Casado
<i>A. nenday</i>	FMNH190421	M	NA	NA	NA
<i>A. nenday</i>	FMNH152838	M	Paraguay	Chaco	Puerto Casado
<i>A. nenday</i>	FMNH152839	F	Paraguay	Chaco	Puerto Casado
<i>A. nenday</i>	FMNH185159	M	Paraguay	NA	NA
<i>A. nenday</i>	FMNH155821	M	Paraguay	NA	NA

<i>A. nenday</i>	FMNH155820	F	Paraguay	Chaco	NA
<i>A. nenday</i>	FMNH155408	F	NA	NA	NA
<i>A. nenday</i>	FMNH185160	F	Paraguay	NA	NA
<i>A. nenday</i>	FMNH371846	F	captivity	Florida	Parrot Jungle
<i>A. nenday</i>	BMNH95.9.8.132	F	Paraguay	NA	Rio Pilcomayo
<i>A. nenday</i>	BMNH90.6.1.44	NA	Argentina	NA	Buenos Aires
<i>A. nenday</i>	BMNH38.12.18.25	NA	Paraguay	NA	NA
<i>A. nenday</i>	BMNH95.9.8.133	NA	Paraguay	NA	Rio Pilcomayo
<i>A. nenday</i>	BMNH95.9.8.131	M	Paraguay	NA	Rio Pilcomayo
<i>E. astec</i>	AMNH804996	M	Mexico	Tamaulipas	Tampico
<i>E. nana</i>	AMNH474529	F	Jamaica		Trelawny
<i>E. nana</i>	AMNH474532	M	Jamaica		Falmouth
<i>E. nana</i>	AMNH44723	NA	Jamaica		Spanishtown
<i>E. nana</i>	AMNH474527	M	Jamaica		Trelawny
<i>E. nana</i>	AMNH474533	M	Jamaica		Falmouth
<i>E. nana</i>	AMNH474535	F	Jamaica		Falmouth
<i>E. nana</i>	AMNH474530	F	Jamaica		Trelawny
<i>E. nana</i>	AMNH230310	F	captivity	New York	Zoological Park
<i>E. nana</i>	AMNH474526	M	Jamaica		Trelawny
<i>E. nana</i>	USNM354360	F	Jamaica		Lumsden, near Claremont
<i>E. nana</i>	USNM354361	M	Jamaica	Trelawney	Baron Hill
<i>E. nana</i>	USNM354359	F	Jamaica		Baron Hill
<i>E. nana</i>	USNM191515	NA	Jamaica		Crown lands
<i>E. nana</i>	USNM38002	M	Jamaica		Spanish Town
<i>E. nana</i>	USNM233462	M	Jamaica		Falmouth
<i>E. nana</i>	USNM191516	F	Jamaica		Crown lands
<i>E. nana</i>	USNM191514	F	Jamaica	NA	NA
<i>E. nana</i>	USNM233463	F	Jamaica		Falmouth
<i>E. nana</i>	FMNH40321	F	Jamaica	Middlesex	St.Thomas Vale
<i>E. nana</i>	BMNH46.5.26.18	NA	Jamaica	NA	NA
<i>E. nana</i>	BMNH1905.1.14.3	NA	Jamaica		Mandeville
<i>E. nana</i>	BMNH46.5.26.17	NA	Jamaica	NA	NA
<i>E. nana</i>	BMNH90.6.1.71	NA	Jamaica		Trelawny
<i>E. nana</i>	BMNH70.4.13.10	F	Jamaica		Spanishtown
<i>E. nana</i>	BMNH89.1.30.127	M	Jamaica		Freeman's Hall, Trelawny
<i>E. nana</i>	LSUMZ142060	M	Jamaica		Trelawny Park
<i>E. astec</i>	AMNH233593	M	Panama	Bocas del Toro	Almirante
<i>E. astec</i>	BMNH1859.11.22.58	NA	Mexico	NA	NA
<i>E. astec</i>	AMNH804996	M	Mexico	Tamaulipas	Tampico
<i>E. astec</i>	AMNH106209	M	Mexico	Oaxaca	Rio Givicia
<i>E. astec</i>	AMNH103300	M	Nicaragua		Rio Coco, Wanks River
<i>E. astec</i>	AMNH474514	M	Mexico	Yucatan	Chable
<i>E. astec</i>	AMNH389268	M	Costa Rica		Guapilez
<i>E. astec</i>	AMNH389270	M	Costa Rica		Val. Turrialba, Faz. La Iberia
<i>E. astec</i>	AMNH776271	F	Mexico	Oaxaca	Sarabia
<i>E. astec</i>	AMNH326006	F	Honduras		Caliche, Orica, Tegucigalpa

<i>E. astec</i>	AMNH393737	M	Guatemala		Secanquim
<i>E. astec</i>	AMNH406627	F	Guatemala		Chimoxan
<i>E. astec</i>	AMNH393738	F	Guatemala		Secanquim
<i>E. astec</i>	USNM204350	M	Mexico	Tabasco	San Juan Bautista
<i>E. astec</i>	USNM359638	M	Mexico	Veracruz	Tres Zapotes Camp
<i>E. astec</i>	USNM120266	M	Honduras		Santa Ana
<i>E. astec</i>	USNM120267	M	Honduras		Santa Ana
<i>E. astec</i>	USNM126331	M	Costa Rica		Rio Frio
<i>E. astec</i>	USNM128382	M	Nicaragua		Escondido River
<i>E. astec</i>	USNM487702	M	Mexico	Oaxaca	Sarabia
<i>E. astec</i>	USNM112586	M	Honduras		Trujillo
<i>E. astec</i>	USNM155371	F	Mexico	Veracruz	Motzorongo
<i>E. astec</i>	USNM192766	F	Costa Rica		La Concepcion
<i>E. astec</i>	FMNH122791	F	Mexico	Vera Cruz	Puerta Nacional
<i>E. astec</i>	FMNH187111	M	Mexico	Vera Cruz	Oiochico
<i>E. astec</i>	FMNH40256	F	Mexico	Yucatan	NA
<i>E. astec</i>	FMNH40258	M	Mexico	Yucatan	NA
<i>E. astec</i>	FMNH40255	F	Mexico	Yucatan	NA
<i>E. astec</i>	FMNH110228	M	Mexico	Yucatan	Itza
<i>E. astec</i>	MCZ48482	M	Mexico	Tamaulipas	NA
<i>E. astec</i>	LSUMZ7486	M	Mexico	Tamaulipas	Alta Mira
<i>E. astec</i>	LSUMZ7485	F	Mexico	Tamaulipas	Alta Mira
<i>E. astec</i>	LSUMZ10958	F	Mexico	San Luis Potosi	10 mi W Ebano, Hacienda Limon, 45 ft
<i>E. astec</i>	LSUMZ16429	F	Mexico	San Luis Potosi	Ebano
<i>E. astec</i>	LSUMZ10957	F	Mexico	San Luis Potosi	Laguna, 3 mi E Tamuin
<i>E. astec</i>	LSUMZ16772	F	Mexico	San Luis Potosi	NA
<i>E. astec</i>	LSUMZ16773	M	Mexico	San Luis Potosi	10.5 mi W of Ebano
<i>E. astec</i>	LSUMZ10959	M	Mexico	San Luis Potosi	Ebano at Cerro La pez
<i>E. astec</i>	LSUMZ16774	M	Mexico	San Luis Potosi	Puente de Dios, Rio Santa maria
<i>E. astec</i>	LSUMZ16428	M	Mexico	San Luis Potosi	19 km W Ebano
<i>E. astec</i>	LSUMZ16775	F	Mexico	San Luis Potosi	Valles
<i>E. astec</i>	LSUMZ100185	M	Mexico	Veracruz	Minatitlan
<i>E. astec</i>	LSUMZ140377	M	Mexico	Veracruz	NE Catemaco
<i>E. astec</i>	LSUMZ39659	M	Mexico	Veracruz	La Gloria, 45 mi S of Acayucan
<i>E. astec</i>	LSUMZ2833	M	Mexico	Veracruz	Piedras Negras
<i>E. astec</i>	LSUMZ48666	NA	Mexico	Vera Cruz	Ocotol Chico, 1900 ft
<i>E. astec</i>	LSUMZ2834	M	Mexico	Veracruz	Piedras Negras
<i>E. astec</i>	LSUMZ2832	F	Mexico	Veracruz	Piedras Negras
<i>E. astec</i>	LSUMZ24297	M	Mexico	Oaxaca	1 mi SW Valle Nacional
<i>E. astec</i>	BMNH99.6.30.465	M	Guatemala	Tierra Caliente	Sierra de las Minas
<i>E. astec</i>	BMNH45.11.2.14	F	Honduras	NA	NA
<i>E. astec</i>	BMNH1900.7.30.76	F	Costa Rica		Jiminez
<i>E. astec</i>	BMNH96.12.1.95	M	Nicaragua	La Libertad	Chontales
<i>E. astec</i>	BMNH89.1.30.130	NA	Mexico	Northern	NA

				Yucatan	
<i>E. astec</i>	BMNH96.12.1.77	F	Mexico	Canton de Cordova	San Lorenzo
<i>E. astec</i>	BMNH90.vi.1.74	NA	Belize	NA	NA
<i>E. astec</i>	BMNH96.12.1.96	M	Mexico	Tamaulipas	Tampico
<i>E. astec</i>	BMNH89.1.30.128	NA	Mexico	Veracruz	Veracruz
<i>E. astec</i>	MNHM451	F	Mexico	Yucatan	Chable
<i>E. astec</i>	MNHN450	M	Costa Rica		San Carlos
<i>E. astec</i>	MNHN452	M	Mexico	Yucatan	NA
<i>E. astec</i>	MNHN453	F	Mexico	Yucatan	NA
<i>E. astec</i>	MNHN447	M	Mexico	Yucatan	NA
<i>E. astec</i>	MNHN449	NA	Mexico	Yucatan	NA
<i>E. astec</i>	USNM363476	M	Mexico	Tamaulipas	Gomez Farias
<i>E. astec</i>	FMNH12252	F	Mexico	Tamaulipas	Tampico
<i>E. astec</i>	FMNH12248	M	Mexico	Tamaulipas	Tampico
<i>E. astec</i>	FMNH12242	M	Mexico	Tamaulipas	Tampico
<i>E. astec</i>	FMNH13429	M	Mexico	Tamaulipas	Tampico
<i>E. astec</i>	FMNH12244	M	Mexico	Tamaulipas	Tampico
<i>E. astec</i>	FMNH12250	M	Mexico	Tamaulipas	Tampico
<i>E. astec</i>	FMNH12640	M	Mexico	Tamaulipas	Tampico
<i>E. astec</i>	FMNH12251	M	Mexico	Tamaulipas	Tampico
<i>E. astec</i>	FMNH12257	F	Mexico	Tamaulipas	Tampico
<i>E. astec</i>	FMNH12256	F	Mexico	Tamaulipas	Tampico
<i>E. canicularis</i>	MLZ4343	F	Mexico	Sinaloa	El Mulino
<i>E. canicularis</i>	AMNH91219	F	Mexico	Sinaloa	Arroyo de Lemones
<i>E. canicularis</i>	AMNH91213	F	Mexico	Sinaloa	Cosala
<i>E. canicularis</i>	AMNH71559	F	Mexico	Sinaloa	Escuinapa
<i>E. canicularis</i>	AMNH776275	F	Mexico	Oaxaca	Rancho Sol y Luna, 8 mi NW Tapanatepec
<i>E. canicularis</i>	AMNH474569	M	Mexico	Jalisco	Terro Tepic, Sierra de Alica
<i>E. canicularis</i>	AMNH474572	F	Mexico	Jalisco	Las Penas
<i>E. canicularis</i>	AMNH781192	NA	Mexico	Oaxaca	20 mi NW of La Ventosa
<i>E. canicularis</i>	AMNH91221	F	Mexico	Sinaloa	Juanna Gomez
<i>E. canicularis</i>	AMNH781190	M	Mexico	NA	NA
<i>E. canicularis</i>	AMNH813258	M	Guatemala	Santa Rosa	La Avellana
<i>E. canicularis</i>	AMNH71563	M	Mexico	NA	NA
<i>E. canicularis</i>	AMNH474568	F	Mexico	Jalisco	Terro Tepic, Sierra de Nayarit
<i>E. canicularis</i>	AMNH776294	M	Mexico	Oaxaca	Rancho Sol y Luna, 8 mi NW Tapanatepec
<i>E. canicularis</i>	AMNH813261	M	Guatemala	Jutlapa	Montufar, El Paraiso
<i>E. canicularis</i>	AMNH393735	M	Guatemala		Ocos
<i>E. canicularis</i>	AMNH393731	F	Guatemala		Ocos
<i>E. canicularis</i>	AMNH91218	F	Mexico	Sinaloa	Escuinapa
<i>E. canicularis</i>	AMNH775910	F	Mexico	Oaxaca	Chiapas line, 10 mi E Tapanatepec
<i>E. canicularis</i>	AMNH71560	F	Mexico	Sinaloa	Escuinapa
<i>E. canicularis</i>	USNM51443	M	Mexico	Sinaloa	Mazatlan

<i>E. canicularis</i>	USNM51445	F	Mexico	Sinaloa	Mazatlan
<i>E. canicularis</i>	USNM55415	NA	Mexico	Sinaloa	Mazatlan
<i>E. canicularis</i>	USNM307929	M	captivity	NA	NA
<i>E. canicularis</i>	USNM126609	M	Mexico	NA	NA
<i>E. canicularis</i>	USNM126608	M	Mexico	NA	NA
<i>E. canicularis</i>	USNM164445	M	Mexico	Sinaloa	Mazatlan
<i>E. canicularis</i>	USNM29318	M	Mexico	Colima	NA
<i>E. canicularis</i>	USNM155376	F	Mexico	Colima	Manzanillo Bay
<i>E. canicularis</i>	USNM164447	F	Mexico	Sinaloa	Mazatlan
<i>E. canicularis</i>	USNM164448	M	Mexico	Durango	Chacala
<i>E. canicularis</i>	USNM30112	F	Mexico	Colima	Manzanillo Bay
<i>E. canicularis</i>	FMNH12241	M	Mexico	Guerrero	Apipilulco
<i>E. canicularis</i>	FMNH13430	M	Mexico	Guerrero	Apipilulco
<i>E. canicularis</i>	FMNH12239	F	Mexico	Guerrero	Apipilulco
<i>E. canicularis</i>	FMNH12240	F	Mexico	Guerrero	Apipilulco
<i>E. canicularis</i>	FMNH40254	M	Mexico	Oaxaca	Cacoprieto
<i>E. canicularis</i>	FMNH102545	M	Mexico	Michoacan	Apatzingan
<i>E. canicularis</i>	FMNH102546	M	Mexico	Michoacan	Apatzingan
<i>E. canicularis</i>	BMNH96.12.1.111	F	Mexico	Guerrero	Tierra Colorada, 2000 ft
<i>E. canicularis</i>	BMNH96.12.1.110	NA	Mexico	Guerrero	Acapulco
<i>E. canicularis</i>	BMNH96.12.1.109	F	Mexico	Guerrero	Acapulco
<i>E. canicularis</i>	BMNH90.6.1.56	NA	Mexico	NA	NA
<i>E. canicularis</i>	BMNH96.12.1.112	NA	Mexico	Guerrero	Dos Arroyos, 1000 ft
<i>E. canicularis</i>	MNHN26	M	Mexico	Michoacan	Coahuayana
<i>E. canicularis</i>	MNHN27	F	Mexico	Michoacan	Coahuayana
<i>E. canicularis</i>	MNHN28	F	Mexico	Michoacan	Coahuayana
<i>E. canicularis</i>	FMNH371835	M	captivity	NA	NA
<i>E. canicularis</i>	FMNH12724	M	Mexico	Colima	Colima
<i>E. canicularis</i>	BMNH89.1.30.102	M	Mexico	Sinaloa	Mazatlan
<i>E. canicularis</i>	BMNH89.1.30.103	F	Mexico	Sinaloa	Mazatlan
<i>E. canicularis</i>	BMNH96.12.1.113	F	Mexico	Colima	Plains of Colima
<i>E. canicularis</i>	BMNH89.1.30.104	M	Mexico	Colima	Plains of Colima
<i>E. canicularis</i>	BMNH59.11.22.6	NA	Mexico	NA	NA
<i>E. canicularis</i>	BMNH96.12.1.103	M	Mexico	Nayarit	Terr. De Tepic, San Blas
<i>E. canicularis</i>	BMNH96.12.1.100	M	Mexico	Nayarit	Terr. De Tepic, Santiago
<i>E. canicularis</i>	BMNH96.12.1.99	M	Mexico	Nayarit	Terr. De Tepic, Santiago
<i>E. canicularis</i>	BMNH96.12.1.101	F	Mexico	Nayarit	Terr. De Tepic, San Blas
<i>E. canicularis</i>	BMNH96.12.1.107	F	Mexico	Colima	Colima
<i>E. canicularis</i>	FMNH208679	M	Mexico	Chiapas	40 mi NW of Arriaga, Hacienda Monserrate
<i>E. canicularis</i>	FMNH208676	F	Mexico	Chiapas	40 mi NW of Arriaga, Hacienda Monserrate
<i>E. canicularis</i>	FMNH208680	F	Mexico	Chiapas	40 mi NW of Arriaga, Hacienda Monserrate
<i>E. canicularis</i>	FMNH208677	M	Mexico	Chiapas	40 mi NW of Arriaga, Hacienda Monserrate
<i>E. canicularis</i>	FMNH208678	M	Mexico	Chiapas	40 mi NW of Arriaga, Hacienda Monserrate

<i>E. canicularis</i>	FMNH208675	M	Mexico	Chiapas	40 mi NW of Arriaga, Hacienda Monserrate
<i>E. canicularis</i>	AMNH813257	NA	Guatemala	Santa Rosa	La Avellana
<i>E. canicularis</i>	AMNH775911	F	Mexico	Oaxaca	Rio Ostuta, 4 mi W Zanatepec
<i>E. canicularis</i>	AMNH393729	M	Guatemala		Ocos
<i>E. canicularis</i>	AMNH704429	M	Mexico	NA	NA
<i>E. canicularis</i>	AMNH813260	M	Guatemala	Santa Rosa	La Avellana
<i>E. canicularis</i>	AMNH393730	M	Guatemala		Ocos
<i>E. canicularis</i>	AMNH389275	M	Costa Rica		Orotina
<i>E. canicularis</i>	AMNH474584	NA	Guatemala		Vera Paz
<i>E. canicularis</i>	AMNH474567	M	Mexico		Sierra de Nayerit
<i>E. canicularis</i>	AMNH393733	F	Guatemala		Ocos
<i>E. canicularis</i>	AMNH393726	F	Guatemala		Progreso
<i>E. canicularis</i>	AMNH813256	M	Guatemala	Santa Rosa	La Avellana
<i>E. canicularis</i>	AMNH474585	NA	Guatemala	NA	NA
<i>E. canicularis</i>	AMNH326011	F	Honduras	5 km S of Sabana Grande, Tegucigalpa	Piedra de Jesus
<i>E. canicularis</i>	AMNH474575	F	Mexico	Guerrero	Acapulco
<i>E. canicularis</i>	AMNH44704	M	Mexico	Oaxaca	Chihuitan, Tehuantepec
<i>E. canicularis</i>	AMNH326010	M	Honduras	5 km S of Sabana Grande, Tegucigalpa	Piedra de Jesus
<i>E. canicularis</i>	AMNH393734	M	Guatemala		Ocos
<i>E. canicularis</i>	AMNH776273	M	Mexico	Oaxaca, 8 mi NW Tapanatepec	Rancho Sol y Luna
<i>E. canicularis</i>	AMNH393727	F	Guatemala		Progreso
<i>E. canicularis</i>	USNM189129	M	Mexico		Acapulco
<i>E. canicularis</i>	USNM192764	M	Costa Rica		La Sabana
<i>E. canicularis</i>	USNM361458	M	Costa Rica		Liberia
<i>E. canicularis</i>	USNM54212	NA	Mexico	Oaxaca	Tehuantepec
<i>E. canicularis</i>	USNM349537	F	Guatemala		Alotenango
<i>E. canicularis</i>	USNM361459	F	Costa Rica		Liberia
<i>E. canicularis</i>	USNM361461	F	Costa Rica		Liberia
<i>E. canicularis</i>	USNM155375	M	Mexico	Colima	Manzanillo
<i>E. canicularis</i>	USNM89997	M	Guatemala		Naranjo
<i>E. canicularis</i>	USNM29413	NA	El Salvador		La Union
<i>E. canicularis</i>	LSUMZ166806	F	Mexico	Oaxaca	Tapanatepec, 8 km N by road
<i>E. canicularis</i>	LSUMZ166806	M	Mexico	Oaxaca	Tapanatepec, 8 km N by road
<i>E. canicularis</i>	LSUMZ39666	F	Mexico	Oaxaca	Rancho, Santa Efigenia, 12 mi NW of Tapanatepec
<i>E. canicularis</i>	BMNH1949.58.139	M	Costa Rica		Miravalles
<i>E. canicularis</i>	BMNH1969.25.774	M	Costa Rica		Bagaces
<i>E. canicularis</i>	BMNH1969.25.775	M	Costa Rica		Miravalles
<i>E. canicularis</i>	BMNH96.12.1.117	M	El Salvador		La Libertad

<i>E. canicularis</i>	BMNH59.11.22.55	NA	Nicaragua		NA
<i>E. canicularis</i>	BMNH96.12.1.115	F	Guatemala		Retalhuleu
<i>E. canicularis</i>	BMNH96.12.1.114	F	Mexico	Chiapas	Tonala
<i>E. canicularis</i>	BMNH89.1.30.106	M	Mexico	Oaxaca	Tehuantepec, Cacoprieto
<i>E. canicularis</i>	LSUMZ27410	F	Mexico	Oaxaca	11 mi N Pochutla, 900 ft
<i>E. canicularis</i>	LSUMZ43749	M	Mexico	Oaxaca	Rancho, Santa Efigenia, 12 mi NW of Tapanatepec
<i>E. canicularis</i>	LSUMZ27412	F	Mexico	Oaxaca	11 mi N Pochutla, 900 ft
<i>E. canicularis</i>	LSUMZ43751	F	Mexico	Oaxaca	Punto Paloma, Mar Muerto
<i>E. canicularis</i>	LSUMZ43752	M	Mexico	Oaxaca	10 mi S of Matias Romero
<i>E. canicularis</i>	LSUMZ33042	M	Mexico	Oaxaca	9 mi E Tapanatepec
<i>E. canicularis</i>	LSUMZ24300	M	Mexico	Oaxaca	3 mi E Tapanatepec
<i>E. aurea</i>	AMNH149401	M	Paraguay	Rio Paraguay	Puerto Pinasco
<i>E. aurea</i>	AMNH44698	NA	Brazil	Bahia	NA
<i>E. aurea</i>	AMNH474563	M	Brazil	Bahia	NA
<i>E. aurea</i>	AMNH474542	F	Bolivia	Sara	Campos, 750 m
<i>E. aurea</i>	AMNH474564	M	Brazil	Bahia	NA
<i>E. aurea</i>	AMNH474556	M	Brazil	Bahia	Rio Preto
<i>E. aurea</i>	AMNH474565	NA	Brazil	Bahia	NA
<i>E. aurea</i>	AMNH474538	M	Bolivia	Sara	Province of Sara
<i>E. aurea</i>	AMNH474537	M	Bolivia	Sara	Province of Sara
<i>E. aurea</i>	FMNH295976	M	Bolivia	Santa Cruz	Santiagoma, 600 m
<i>E. aurea</i>	FMNH295977	F	Bolivia	Santa Cruz	Santiagoma, 600 m
<i>E. aurea</i>	FMNH295975	M	Bolivia	Santa Cruz	Santiagoma, 700 m
<i>E. aurea</i>	FMNH179098	F	Bolivia	Santa Cruz	Cercado
<i>E. aurea</i>	FMNH8481	M	Brazil	Pará	Santarem
<i>E. aurea</i>	FMNH8482	F	Brazil	Pará	Santarem
<i>E. aurea</i>	FMNH62921	M	Brazil	Piauí	Deserto
<i>E. aurea</i>	FMNH62926	F	Brazil	Maranhão	Tranqueira
<i>E. aurea</i>	FMNH62925	F	Brazil	Maranhão	Alto Parnaiba
<i>E. aurea</i>	FMNH62928	M	Brazil	Maranhão	Codo. Cocos
<i>E. aurea</i>	FMNH62924	F	Brazil	Maranhão	Grajahu
<i>E. aurea</i>	FMNH62929	M	Brazil	Maranhão	Codo. Cocos
<i>E. aurea</i>	FMNH62927	M	Brazil	Maranhão	Codo. Cocos
<i>E. aurea</i>	FMNH46991	M	Brazil	Bahia	São Marcelo
<i>E. aurea</i>	USNM36679	NA	Brazil	Pará	NA
<i>E. aurea</i>	USNM121055	M	Brazil	Minas Gerais	Diamantina
<i>E. aurea</i>	USNM368159	F	Brazil	Espirito Santo	Colatina
<i>E. aurea</i>	USNM333550	F	captivity	NA	Natural Zoological Park
<i>E. aurea</i>	USNM312988	F	captivity	NA	Natural Zoological Park
<i>E. aurea</i>	USNM145659	F	Brazil	NA	NA
<i>E. aurea</i>	USNM515993	F	Brazil	Goiás	Aragarças
<i>E. aurea</i>	USNM515996	M	Brazil	Goiás	Araguatins
<i>E. aurea</i>	USNM515995	M	Brazil	Brasília	Brasília
<i>E. aurea</i>	USNM514689	F	Brazil	Amapa	Porto Platon
<i>E. aurea</i>	USNM514688	F	Brazil	Amapa	Porto Platon

<i>E. aurea</i>	USNM515994	M	Brazil	Goiás	Aragarças
<i>E. aurea</i>	USNM368160	M	Brazil	Espirito Santo	Colatina
<i>E. aurea</i>	USNM145660	M	Brazil	NA	NA
<i>E. aurea</i>	USNM276912	M	Brazil	Pará	Santarém
<i>E. aurea</i>	AMNH127344	F	Brazil	Mato Grosso	Palmiras, Rio Taquary
<i>E. aurea</i>	AMNH127346	M	Brazil	Mato Grosso	Palmiras, Rio Taquary
<i>E. aurea</i>	AMNH127343	M	Brazil	Mato Grosso	José Bonifacio
<i>E. aurea</i>	AMNH319664	F	Paraguay		Rio Ipané
<i>E. aurea</i>	AMNH321806	M	Brazil	Mato Grosso	Campanario, Faz. São Francisco
<i>E. aurea</i>	AMNH321808	F	Brazil	Mato Grosso	Campanario, Faz. São Francisco
<i>E. aurea</i>	AMNH241709	NA	Brazil	Maranhão	São Luis, 90 km up Terezinha
<i>E. aurea</i>	AMNH241718	F	Brazil	Maranhão	As Manguieras (Flores)
<i>E. aurea</i>	AMNH241710	F	Brazil	Maranhão	São Luis, 90 km up Terezinha
<i>E. aurea</i>	AMNH241717	M	Brazil	Maranhão	As Manguieras (Flores)
<i>E. aurea</i>	MZUSP3412	F	Brazil	Pará	Santarém
<i>E. aurea</i>	3MZUSP413	M	Brazil	Pará	Santarém
<i>E. aurea</i>	MZUSP32061	M	Brazil	Pará	R. Tapajós (Leste), Santarém
<i>E. aurea</i>	MZUSP38459	M	Brazil	Pará	Cachimbo
<i>E. aurea</i>	MZUSP38460	F	Brazil	Pará	Cachimbo
<i>E. aurea</i>	MZUSP38697	F	Brazil	Pará	Cachimbo
<i>E. aurea</i>	MZUSP38698	F	Brazil	Pará	Cachimbo
<i>E. aurea</i>	MZUSP81993	NA	Brazil	Pará	Faz. Fartura, Santana do Araguaia
<i>E. aurea</i>	MZUSP88052	NA	Brazil	Pará	Fazenda Fartura, Sanatana do Araguaia
<i>E. aurea</i>	MZUSP89885	NA	Brazil	Pará	Fazenda Fartura, Sanatana do Araguaia
<i>E. aurea</i>	MZUSP52366	NA	Brazil	Tocantins	Araguatins
<i>E. aurea</i>	MZUSP79521	NA	Brazil	Tocantins	Mata do rio Galhão, Mateiros
<i>E. aurea</i>	MZUSP79522	NA	Brazil	Tocantins	Mata do rio Galhão, Mateiros
<i>E. aurea</i>	MZUSP79523	M	Brazil	Tocantins	Mata do rio Galhão, Mateiros
<i>E. aurea</i>	MZUSP79524	F	Brazil	Tocantins	Mata do rio Galhão, Mateiros
<i>E. aurea</i>	MZUSP79525	M	Brazil	Tocantins	ESEC Serra Geral do Tocantins
<i>E. aurea</i>	MZUSP79526	F	Brazil	Tocantins	ESEC Serra Geral do Tocantins
<i>E. aurea</i>	MZUSP79527	M	Brazil	Tocantins	ESEC Serra Geral do Tocantins
<i>E. aurea</i>	MZUSP6643	M	Brazil	Maranhão	Primeira Cruz
<i>E. aurea</i>	MZUSP38133	M	Brazil	Maranhão	Aldeia do Ponto
<i>E. aurea</i>	MZUSP42919	F	Brazil	Maranhão	Aldeia do Ponto
<i>E. aurea</i>	MZUSP42920	F	Brazil	Maranhão	Aldeia do Ponto
<i>E. aurea</i>	MZUSP42921	NA	Brazil	Maranhão	Aldeia do Ponto
<i>E. aurea</i>	MZUSP75217	NA	Brazil	Piauí	E. E. Urucui-Una, Bom Jesus

<i>E. aurea</i>	MZUSP75218	NA	Brazil	Piauí	E. E. Urucui-Una, Bom Jesus
<i>E. aurea</i>	MZUSP75219	NA	Brazil	Piauí	Faz. Emaflor, Bom Jesus
<i>E. aurea</i>	MZUSP41507	M	Brazil	Ceará	Icarai, Mosquito
<i>E. aurea</i>	MZUSP41508	M	Brazil	Ceará	Icarai, Mosquito
<i>E. aurea</i>	MZUSP39548	M	Brazil	Paraíba	R. Tinto, Uruba
<i>E. aurea</i>	MZUSP39549	M	Brazil	Paraíba	Mamanguape, Camaratuba
<i>E. aurea</i>	MZUSP39550	F	Brazil	Paraíba	Mamanguape, Camaratuba
<i>E. aurea</i>	MZUSP39551	F	Brazil	Paraíba	Mamanguape, Camaratuba
<i>E. aurea</i>	MZUSP39552	F	Brazil	Paraíba	Mamanguape, Camaratuba
<i>E. aurea</i>	MZUSP39553	NA	Brazil	Paraíba	Mamanguape, Camaratuba
<i>E. aurea</i>	MZUSP2269	NA	Brazil	Bahia	NA
<i>E. aurea</i>	MZUSP13991	M	Brazil	Bahia	Curupeba, próximo a Ilha Madre Deus
<i>E. aurea</i>	MZUSP13992	M	Brazil	Bahia	Curupeba, próximo a Ilha Madre Deus
<i>E. aurea</i>	MZUSP13993	M	Brazil	Bahia	Ilha de Madre Deus
<i>E. aurea</i>	MZUSP33035	M	Brazil	Bahia	Ilheus
<i>E. aurea</i>	MZUSP40832	M	Brazil	Bahia	Buritirama, Mun. de Barra
<i>E. aurea</i>	MZUSP40833	F	Brazil	Bahia	Buritirama, Mun. de Barra
<i>E. aurea</i>	MZUSP40834	M	Brazil	Bahia	Santa Rita de Cassia, Rio Preto
<i>E. aurea</i>	MZUSP40835	F	Brazil	Bahia	Santa Rita de Cassia, Rio Preto
<i>E. aurea</i>	MZUSP40836	F	Brazil	Bahia	Santa Rita de Cassia, Rio Preto
<i>E. aurea</i>	MZUSP40837	F	Brazil	Bahia	Santa Rita de Cassia, Rio Preto
<i>E. aurea</i>	MZUSP40838	F	Brazil	Bahia	Santa Rita de Cassia, Rio Preto
<i>E. aurea</i>	MZUSP14893	M	Brazil	Goiás	Jaraguá, Rio das Almas
<i>E. aurea</i>	MZUSP14894	F	Brazil	Goiás	Faz. Man. Peixoto, Rio das Almas
<i>E. aurea</i>	MZUSP15754	M	Brazil	Goiás	Barra do Rio São Domingos
<i>E. aurea</i>	MZUSP15755	M	Brazil	Goiás	Barra do Rio São Domingos
<i>E. aurea</i>	MZUSP26709	M	Brazil	Goiás	Faz. Transvaal, Municipio de Rio Verde
<i>E. aurea</i>	MZUSP26710	M	Brazil	Goiás	Faz. Transvaal, Municipio de Rio Verde
<i>E. aurea</i>	MZUSP38044	F	Brazil	Goiás	Faz. Sta. Adelia, Jataí
<i>E. aurea</i>	MZUSP38045	M	Brazil	Goiás	Faz. Sta. Adelia, Jataí
<i>E. aurea</i>	MZUSP72256	NA	Brazil	Goiás	Alexania
<i>E. aurea</i>	MZUSP72257	M	Brazil	Goiás	Goianira
<i>E. aurea</i>	MZUSP72258	NA	Brazil	Goiás	Alexania
<i>E. aurea</i>	MZUSP72259	NA	Brazil	Goiás	Itaberaí
<i>E. aurea</i>	MZUSP72260	M	Brazil	Goiás	Goianira
<i>E. aurea</i>	MZUSP74214	F	Brazil	Goiás	R. Tocantins (margem esquerda), Campinaçu
<i>E. aurea</i>	MZUSP74609	M	Brazil	Goiás	Nerópolis
<i>E. aurea</i>	MZUSP74610	M	Brazil	Goiás	Caldas Novas
<i>E. aurea</i>	MZUSP74611	F	Brazil	Goiás	Caldas Novas

<i>E. aurea</i>	MZUSP74612	F	Brazil	Goiás	Bela Vista
<i>E. aurea</i>	MZUSP74613	M	Brazil	Goiás	Bela Vista
<i>E. aurea</i>	MZUSP74614	M	Brazil	Goiás	Hidrolândia
<i>E. aurea</i>	MZUSP74615	F	Brazil	Goiás	Varjão
<i>E. aurea</i>	MZUSP74616	F	Brazil	Goiás	Caldas Novas
<i>E. aurea</i>	MZUSP74617	F	Brazil	Goiás	Nerópolis
<i>E. aurea</i>	MZUSP74738	F	Brazil	Goiás	Lagoa Formosa, Cabeceiras
<i>E. aurea</i>	MZUSP94570	NA	Brazil	Goiás	Campinaçu
<i>E. aurea</i>	MZUSP51816	M	Brazil	Distrito Federal	Planaltina
<i>E. aurea</i>	MZUSP51817	M	Brazil	Distrito Federal	Planaltina
<i>E. aurea</i>	MZUSP52365	M	Brazil	Distrito Federal	Planaltina
<i>E. aurea</i>	MZUSP9914	M	Brazil	Mato Grosso	São Luís de Cáceres
<i>E. aurea</i>	MZUSP9941	NA	Brazil	Mato Grosso	São Luís de Cáceres
<i>E. aurea</i>	MZUSP30146	M	Brazil	Mato Grosso	Faz. Aricá, Rio Aricá
<i>E. aurea</i>	MZUSP30147	F	Brazil	Mato Grosso	Cuiabá
<i>E. aurea</i>	MZUSP30148	F	Brazil	Mato Grosso	Cuiabá
<i>E. aurea</i>	MZUSP30149	M	Brazil	Mato Grosso	Cuiabá
<i>E. aurea</i>	MZUSP30150	F	Brazil	Mato Grosso	Faz. Aricá, Rio Aricá
<i>E. aurea</i>	MZUSP32299	F	Brazil	Mato Grosso	Chavantina, Rio das Mortes
<i>E. aurea</i>	MZUSP32300	M	Brazil	Mato Grosso	Chavantina, Rio das Mortes
<i>E. aurea</i>	MZUSP35015	M	Brazil	Mato Grosso	Dumbá
<i>E. aurea</i>	MZUSP35016	F	Brazil	Mato Grosso	Dumbá
<i>E. aurea</i>	MZUSP35017	F	Brazil	Mato Grosso	São Domingos, Rio das Mortes
<i>E. aurea</i>	MZUSP75876	M	Brazil	Mato Grosso	Alto do Garças
<i>E. aurea</i>	MZUSP88837	NA	Brazil	Mato Grosso	Jangada
<i>E. aurea</i>	MZUSP12227	NA	Brazil	Mato Grosso do Sul	Faz. Monte Verde, Coxim
<i>E. aurea</i>	MZUSP12689	M	Brazil	Mato Grosso do Sul	Jupia, Barranca do Rio Parana
<i>E. aurea</i>	MZUSP12690	M	Brazil	Mato Grosso do Sul	Jupia, Barranca do Rio Parana
<i>E. aurea</i>	MZUSP12691	M	Brazil	Mato Grosso do Sul	Jupia, Barranca do Rio Parana
<i>E. aurea</i>	MZUSP12692	F	Brazil	Mato Grosso do Sul	Jupia, Barranca do Rio Parana
<i>E. aurea</i>	MZUSP18283	F	Brazil	Mato Grosso do Sul	Salobra
<i>E. aurea</i>	MZUSP18284	F	Brazil	Mato Grosso do Sul	Salobra
<i>E. aurea</i>	MZUSP18285	F	Brazil	Mato Grosso do Sul	Salobra
<i>E. aurea</i>	MZUSP29058	F	Brazil	Mato Grosso do Sul	Salobra
<i>E. aurea</i>	MZUSP64147	M	Brazil	Mato Grosso do Sul	R. Sucuriu (margem esquerda), Três Lagoas
<i>E. aurea</i>	MZUSP64148	M	Brazil	Mato Grosso do Sul	R. Sucuriu (margem

				Sul	esquerda), Três Lagoas
<i>E. aurea</i>	MZUSP64149	F	Brazil	Mato Grosso do Sul	R. Sucuriu (margem esquerda), Três Lagoas
<i>E. aurea</i>	MZUSP64150	M	Brazil	Mato Grosso do Sul	R. Sucuriu (margem direita), Três Lagoas
<i>E. aurea</i>	MZUSP64151	F	Brazil	Mato Grosso do Sul	R. Sucuriu (margem esquerda), Três Lagoas
<i>E. aurea</i>	MZUSP64152	NA	Brazil	Mato Grosso do Sul	R. Sucuriu (margem esquerda), Três Lagoas
<i>E. aurea</i>	MZUSP64153	M	Brazil	Mato Grosso do Sul	R. Sucuriu (margem esquerda), Três Lagoas
<i>E. aurea</i>	MZUSP64154	F	Brazil	Mato Grosso do Sul	R. Sucuriu (margem esquerda), Três Lagoas
<i>E. aurea</i>	MZUSP64155	F	Brazil	Mato Grosso do Sul	R. Sucuriu (margem esquerda), Três Lagoas
<i>E. aurea</i>	MZUSP64156	M	Brazil	Mato Grosso do Sul	R. Sucuriu (margem esquerda), Três Lagoas
<i>E. aurea</i>	MZUSP64157	M	Brazil	Mato Grosso do Sul	R. Sucuriu (margem esquerda), Três Lagoas
<i>E. aurea</i>	MZUSP64158	F	Brazil	Mato Grosso do Sul	R. Sucuriu (margem esquerda), Três Lagoas
<i>E. aurea</i>	MZUSP64159	NA	Brazil	Mato Grosso do Sul	R. Sucuriu (margem direita), Três Lagoas
<i>E. aurea</i>	MZUSP74378	F	Brazil	Mato Grosso do Sul	R. Sucuriu (margem direita), Três Lagoas
<i>E. aurea</i>	MZUSP74379	F	Brazil	Mato Grosso do Sul	R. Sucuriu (margem esquerda), Três Lagoas
<i>E. aurea</i>	MZUSP74380	F	Brazil	Mato Grosso do Sul	R. Sucuriu (margem esquerda), Três Lagoas
<i>E. aurea</i>	MZUSP74381	F	Brazil	Mato Grosso do Sul	R. Sucuriu (margem direita), Três Lagoas - Retiro da Telha
<i>E. aurea</i>	MZUSP74382	M	Brazil	Mato Grosso do Sul	R. Sucuriu (margem direita), Três Lagoas
<i>E. aurea</i>	MZUSP15756	M	Brazil	Minas Gerais	R. Bandeiro
<i>E. aurea</i>	MZUSP61343	F	Brazil	Minas Gerais	Serra Itatiniaçu
<i>E. aurea</i>	MZUSP61522	M	Brazil	Minas Gerais	Curvelo
<i>E. aurea</i>	MZUSP61523	M	Brazil	Minas Gerais	Curvelo
<i>E. aurea</i>	MZUSP61524	F	Brazil	Minas Gerais	Curvelo
<i>E. aurea</i>	MZUSP74736	M	Brazil	Minas Gerais	Cabeceiras
<i>E. aurea</i>	MZUSP74737	M	Brazil	Minas Gerais	Cabeceiras
<i>E. aurea</i>	MZUSP74739	F	Brazil	Minas Gerais	Cabeceiras
<i>E. aurea</i>	MZUSP78968	M	Brazil	Minas Gerais	Curvelo
<i>E. aurea</i>	MZUSP84344	F	Brazil	Minas Gerais	R. Bandeiro
<i>E. aurea</i>	MZUSP33034	M	Brazil	Espírito Santo	Mun. Colatina, Linhares
<i>E. aurea</i>	MZUSP4272	F	Brazil	São Paulo	Franca, Crystaes
<i>E. aurea</i>	MZUSP4489	F	Brazil	São Paulo	São Jerônimo, Avandava
<i>E. aurea</i>	MZUSP5557	F	Brazil	São Paulo	Bauru
<i>E. aurea</i>	MZUSP23790	F	Brazil	São Paulo	Faz. Ponte Nova, Macaúbas
<i>E. aurea</i>	MZUSP26711	NA	Brazil	São Paulo	Faz. Varjão, Lins
<i>E. aurea</i>	MZUSP26712	F	Brazil	São Paulo	Faz. Varjão, Lins
<i>E. aurea</i>	MZUSP26713	F	Brazil	São Paulo	Faz. Varjão, Lins
<i>E. aurea</i>	MZUSP51295	F	Brazil	São Paulo	Pedregulho, norte extremo

					de SP
<i>E. aurea</i>	MZUSP51296	NA	Brazil	São Paulo	Pedregulho, norte extremo de SP
<i>E. aurea</i>	MZUSP36746	M	Brazil	Paraná	R. Paracáí
<i>E. aurea</i>	LSUMZ28807	M	Brazil	Goiás	Ilha do Bananal, Macauba
<i>E. aurea</i>	LSUMZ84335	F	Peru	Madre de Dios	Pampas de Heath, ca 50 river km S Puerto Pardo
<i>E. aurea</i>	LSUMZ84337	F	Peru	Madre de Dios	Pampas de Heath, ca 50 river km S Puerto Pardo
<i>E. aurea</i>	LSUMZ123512	F	Bolivia	Benij	General Ballivian, 3 km SW San Borja, 450 m
<i>E. aurea</i>	LSUMZ35774	M	Bolivia	Santa Cruz	Buena Vista, Ichilo
<i>E. aurea</i>	LSUMZ37256	NA	Bolivia	Santa Cruz	Buena Vista, Ichilo
<i>E. aurea</i>	LSUMZ168735	F	Bolivia	Santa Cruz	Santa Fe, 138 km SW San Matias
<i>E. aurea</i>	LSUMZ168736	M	Bolivia	Santa Cruz	Estancia Camburas 38 km SSW San Matias
<i>E. aurea</i>	LSUMZ168737	M	Bolivia	Santa Cruz	Camburas 38 km SSW San Matias
<i>E. aurea</i>	LSUMZ168739	M	Bolivia	Santa Cruz	Camburas 38 km SSW San Matias
<i>E. aurea</i>	LSUMZ168738	F	Bolivia	Santa Cruz	Camburas 38 km SSW San Matias
<i>E. aurea</i>	BMNH09.1.30.99	NA	Brazil	Bahia	NA
<i>E. aurea</i>	BMNH90.6.1.54	NA	Brazil	NA	NA
<i>E. aurea</i>	BMNH90.6.1.55	NA	Brazil	Pará	Mexiana Ilha
<i>E. aurea</i>	BMNH1906.12.21.190	M	Brazil	Bahia	Itaparica Ilha
<i>E. aurea</i>	BMNH1939.12.9.2923	F	captivity	SE Brazil	London
<i>E. aurea</i>	BMNH89.1.30.97	NA	Brazil	Bahia	NA
<i>E. aurea</i>	BMNH90.6.1.53	NA	Brazil	Bahia	NA
<i>E. aurea</i>	BMNH89.1.30.98	NA	Brazil	Bahia	NA
<i>E. aurea</i>	BMNH89.1.30.101	M	Brazil	NA	Rio Paraná
<i>E. aurea</i>	BMNH89.1.10.497	F	Brazil	Mato Grosso	Chapada
<i>E. aurea</i>	MHNM433	M	Brazil	Goiás	Itaberaí
<i>E. aurea</i>	MNHN434	F	Brazil	Goiás	Itaberaí
<i>E. aurea</i>	MNHN432	M	Brazil	Goiás	Goianira
<i>E. aurea</i>	MNHN445	M	Brazil	Distrito Federal	Brasilia
<i>E. aurea</i>	MNHN472	F	Brazil	Goiás	Goiania
<i>E. aurea</i>	MNHN473	F	Brazil	Goiás	Goiania
<i>E. cactorum</i>	FMNH46988	M	Brazil	Ceará	Jua',nr. Iguato
<i>E. cactorum</i>	AMNH6220	M	Brazil	NA	NA
<i>E. cactorum</i>	ZSMB17a	NA	Brazil	Bahia	Contendas, Juazeiro
<i>E. cactorum</i>	ZSMB18	NA	Brazil	NA	NA
<i>E. cactorum</i>	ZSMB17	NA	Brazil	Bahia	Contendas, Juazeiro
<i>E. cactorum</i>	MZUSP77650	F	Brazil	Piauí	Lagoa do Jacu/PN Serra das Confusões
<i>E. cactorum</i>	MZUSP77651	F	Brazil	Piauí	Parque Nacional da Serra das Confusões
<i>E. cactorum</i>	MZUSP77652	M	Brazil	Piauí	Parque Nacional da Serra das

					Confusões
<i>E. cactorum</i>	MZUSP77653	F	Brazil	Piauí	Parque Nacional da Serra das Confusões
<i>E. cactorum</i>	MZUSP41501	M	Brazil	Ceará	Baturité, Açudinho
<i>E. cactorum</i>	MZUSP41502	M	Brazil	Ceará	Baturité, Açudinho
<i>E. cactorum</i>	MZUSP41503	M	Brazil	Ceará	Icarai, Mosquito
<i>E. cactorum</i>	MZUSP41504	M	Brazil	Ceará	Icarai, Mosquito
<i>E. cactorum</i>	MZUSP41505	F	Brazil	Ceará	Icarai, Mosquito
<i>E. cactorum</i>	MZUSP41506	F	Brazil	Ceará	Icarai, Mosquito
<i>E. cactorum</i>	MZUSP39529	M	Brazil	Paraíba	Coremas
<i>E. cactorum</i>	MZUSP39530	M	Brazil	Paraíba	Coremas
<i>E. cactorum</i>	MZUSP39531	M	Brazil	Paraíba	Coremas
<i>E. cactorum</i>	MZUSP39532	M	Brazil	Paraíba	Coremas
<i>E. cactorum</i>	MZUSP39533	M	Brazil	Paraíba	Coremas
<i>E. cactorum</i>	MZUSP39534	M	Brazil	Paraíba	Coremas
<i>E. cactorum</i>	MZUSP39535	M	Brazil	Paraíba	Coremas
<i>E. cactorum</i>	MZUSP39536	M	Brazil	Paraíba	Coremas
<i>E. cactorum</i>	MZUSP39537	M	Brazil	Paraíba	Coremas
<i>E. cactorum</i>	MZUSP39538	M	Brazil	Paraíba	Coremas
<i>E. cactorum</i>	MZUSP39539	M	Brazil	Paraíba	Coremas
<i>E. cactorum</i>	MZUSP39540	M	Brazil	Paraíba	Coremas
<i>E. cactorum</i>	MZUSP39541	M	Brazil	Paraíba	Coremas
<i>E. cactorum</i>	MZUSP39542	F	Brazil	Paraíba	Coremas
<i>E. cactorum</i>	MZUSP39543	NA	Brazil	Paraíba	Coremas
<i>E. cactorum</i>	MZUSP39544	F	Brazil	Paraíba	Coremas
<i>E. cactorum</i>	MZUSP39545	F	Brazil	Paraíba	Coremas
<i>E. cactorum</i>	MZUSP39546	F	Brazil	Paraíba	Coremas
<i>E. cactorum</i>	MZUSP39547	F	Brazil	Paraíba	Coremas
<i>E. cactorum</i>	MZUSP63619	M	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>E. cactorum</i>	MZUSP63620	F	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>E. cactorum</i>	MZUSP63621	M	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>E. cactorum</i>	MZUSP63622	F	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>E. cactorum</i>	MZUSP63623	M	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>E. cactorum</i>	MZUSP63624	M	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>E. cactorum</i>	MZUSP63625	F	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>E. cactorum</i>	MZUSP63626	M	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>E. cactorum</i>	MZUSP63627	F	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>E. cactorum</i>	MZUSP63628	NA	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>E. cactorum</i>	MZUSP63629	NA	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)

<i>E. cactorum</i>	MZUSP63630	M	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>E. cactorum</i>	MZUSP63631	NA	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>E. cactorum</i>	MZUSP63632	F	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>E. cactorum</i>	MZUSP63633	F	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>E. cactorum</i>	MZUSP63634	M	Brazil	Pernambuco	Faz. Campos Bons (38Km ao Norte de Floresta)
<i>E. cactorum</i>	MZUSP7328	M	Brazil	Bahia	Juazeiro
<i>E. cactorum</i>	MZUSP7329	M	Brazil	Bahia	Juazeiro
<i>E. cactorum</i>	MZUSP7331	M	Brazil	Bahia	Vila Nova
<i>E. cactorum</i>	MZUSP40839	M	Brazil	Bahia	Buritirama, Mun. de Barra
<i>E. cactorum</i>	MZUSP40840	M	Brazil	Bahia	Buritirama, Mun. de Barra
<i>E. cactorum</i>	MZUSP40841	F	Brazil	Bahia	Buritirama, Mun. de Barra
<i>E. cactorum</i>	MZUSP40842	F	Brazil	Bahia	Buritirama, Mun. de Barra
<i>E. cactorum</i>	MZUSP61526	M	Brazil	Bahia	Itaberaba
<i>E. cactorum</i>	MZUSP8354	M	Brazil	Minas Gerais	Pirapora
<i>E. cactorum</i>	MZUSP15762	F	Brazil	Minas Gerais	R. Bandeiro
<i>E. cactorum</i>	FMNH46989	M	Brazil	Bahia	Queimadas
<i>E. cactorum</i>	FMNH191626	M	Brazil	Minas Gerais	Janauba
<i>E. cactorum</i>	FMNH46990	M	Brazil	Bahia	Queimadas
<i>E. cactorum</i>	FMNH191627	M	Brazil	Minas Gerais	Janauba
<i>E. cactorum</i>	FMNH191628	F	Brazil	Minas Gerais	Janauba
<i>E. cactorum</i>	FMNH344304	F	Brazil	Minas Gerais	Arinos
<i>E. cactorum</i>	MZUSP82707	NA	Brazil	Minas Gerais	Itacarambi, Volta da Serra
<i>E. cactorum</i>	MZUSP82844	NA	Brazil	Minas Gerais	Coração de Jesus
<i>E. cactorum</i>	MZUSP82845	NA	Brazil	Minas Gerais	Coração de Jesus
<i>E. cactorum</i>	MZUSP82846	NA	Brazil	Minas Gerais	Coração de Jesus
<i>E. cactorum</i>	MZUSP82847	NA	Brazil	Minas Gerais	Coração de Jesus
<i>E. cactorum</i>	MZUSP82848	NA	Brazil	Minas Gerais	Coração de Jesus
<i>E. cactorum</i>	MZUSP82874	F	Brazil	Minas Gerais	Coração de Jesus
<i>E. cactorum</i>	MZUSP2112	NA	Brazil	NA	NA
<i>E. cactorum</i>	AMNH241726	M	Brazil	Ceará, 1850 ft	Juazeiro, Serra Verde
<i>E. cactorum</i>	AMNH241725	M	Brazil	Ceará, 800 feet	Lavras, São Domingos
<i>E. cactorum</i>	AMNH241724	F	Brazil	Ceará, 900 feet	Lavras
<i>E. cactorum</i>	AMNH241722	NA	Brazil	Pernambuco	Rio Branco, 2000 feet
<i>E. cactorum</i>	AMNH241732	M	Brazil	Bahia	Barra, 1400 feet
<i>E. cactorum</i>	AMNH241721	M	Brazil	Pernambuco	Rio Branco, 2000 feet
<i>E. cactorum</i>	AMNH241720	F	Brazil	Piauí	Parnagua, 1000 feet
<i>E. cactorum</i>	AMNH241734	F	Brazil	Bahia	Barra, 1400 feet
<i>E. cactorum</i>	AMNH474496	F	Brazil	Bahia	Lamarão
<i>E. cactorum</i>	AMNH474493	M	Brazil	Bahia	Lamarão
<i>E. cactorum</i>	AMNH474494	M	Brazil	Bahia	Lamarão
<i>E. cactorum</i>	AMNH174599	M	Brazil	Bahia	Catinga b.Fac. De Serra, Rio Grande

<i>E. cactorum</i>	AMNH6221	NA	Brazil	NA	NA
<i>E. cactorum</i>	AMNH241736	M	Brazil	Bahia	Morro do Chapeu, 3600 feet
<i>E. cactorum</i>	AMNH139938	M	Brazil	Bahia	Juazeiro
<i>E. cactorum</i>	AMNH241735	M	Brazil	Bahia	Barra, 1400 feet
<i>E. cactorum</i>	AMNH241730	F	Brazil	Ceará, 1850 fe	Juazeiro, Serra Verde
<i>E. cactorum</i>	AMNH241727	M	Brazil	Ceará, 1850 ft	Juazeiro, Serra Verde
<i>E. cactorum</i>	AMNH241729	M	Brazil	Ceará, 1850 ft	Juazeiro, Serra Verde
<i>E. cactorum</i>	AMNH241728	M	Brazil	Ceará, 1850 ft	Juazeiro, Serra Verde
<i>E. cactorum</i>	AMNH474497	M	Brazil	Bahia	Rio Preto
<i>E. cactorum</i>	AMNH474495	F	Brazil	Bahia	Lamarão
<i>E. cactorum</i>	AMNH241742	F	Brazil	Bahia	Tambury, 1100 feet
<i>E. cactorum</i>	AMNH241737	F	Brazil	Bahia	Morro do Chapeu, 3600 feet
<i>E. cactorum</i>	AMNH241741	M	Brazil	Bahia	Tambury, 1100 feet
<i>E. cactorum</i>	AMNH241723	M	Brazil	Ceará, 900 feet	Lavras
<i>E. cactorum</i>	AMNH241738	F	Brazil	Bahia	Morro do Chapeu, 3600 feet
<i>E. cactorum</i>	AMNH241740	M	Brazil	Bahia	Tambury, 1100 feet
<i>E. cactorum</i>	AMNH241739	NA	Brazil	Bahia	Morro do Chapeu, 3600 feet
<i>E. cactorum</i>	AMNH241731	M	Brazil	Bahia	Santa Ritta, 1600 feet
<i>E. cactorum</i>	AMNH241733	F	Brazil	Bahia	Barra, 1400 feet
<i>E. cactorum</i>	USNM257357	F	NA	NA	NA
<i>E. cactorum</i>	USNM257978	F	NA	NA	NA
<i>E. cactorum</i>	USNM264610	M	Brazil	Ceará	Lavras
<i>E. cactorum</i>	USNM264609	F	Brazil	Ceará, 900 feet	Lavras
<i>E. cactorum</i>	USNM264608	F	Brazil	Ceará, 900 feet	Lavras
<i>E. cactorum</i>	FMNH62865	F	Brazil	Piauí	Ibiapaba
<i>E. cactorum</i>	FMNH62866	M	Brazil	Piauí	Ibiapaba
<i>E. cactorum</i>	FMNH62863	F	Brazil	Piauí	Ibiapaba
<i>E. cactorum</i>	FMNH62864	M	Brazil	Piauí	Ibiapaba
<i>E. cactorum</i>	FMNH62862	F	Brazil	Piauí	Ibiapaba
<i>E. cactorum</i>	FMNH62861	F	Brazil	Piauí	Ibiapaba
<i>E. cactorum</i>	BMNH91.1.23.34	NA	captivity		London
<i>E. cactorum</i>	BMNH1903.12.15.13	F	Brazil	Bahia	Lamarão
<i>E. cactorum</i>	BMNH91.1.23.35	NA	captivity		London
<i>E. cactorum</i>	BMNH89.1.30.126	NA	Brazil	Bahia	NA
<i>E. cactorum</i>	BMNH57.3.8.4	JUV	Brazil	Bahia	NA
<i>E. cactorum</i>	BMNH90.6.1.69	NA	Brazil	NA	NA
<i>E. cactorum</i>	BMNH90.4.1.25	F	captivity	NA	London
<i>E. cactorum</i>	BMNH89.1.30.125	NA	Brazil	Bahia	NA
<i>E. cactorum</i>	MNHN1492	NA	NA	NA	NA
<i>E. cactorum</i>	MNHN1554	F	Brazil	Bahia	Lamarão
<i>E. cactorum</i>	MNHN796	NA	Brazil	Pernambuco	Exu
<i>E. cactorum</i>	MNHN462	NA	Brazil	Bahia	NA
<i>E. cactorum</i>	MNHN2003_2526	NA	Brazil	Bahia	NA
<i>E. pertinax</i>	AMNH163848	M	Virgin Islands		St. Thomas

<i>E. pertinax</i>	AMNH474437	M	Virgin Islands		St. Thomas
<i>E. pertinax</i>	AMNH174655	M	Lesser Antilles		Curaçao
<i>E. pertinax</i>	AMNH474438	F	Virgin Islands		St. Thomas
<i>E. pertinax</i>	LSUMZ142061	M	Virgin Islands		St. Thomas
<i>E. pertinax</i>	LSUMZ142062	M	Virgin Islands		St. Thomas
<i>E. pertinax</i>	LSUMZ22027	M	Lesser Antilles		Curacao
<i>E. pertinax</i>	AMNH163844	M	Lesser Antilles		St.Thomas
<i>E. pertinax</i>	AMNH163840	M	Lesser Antilles		St. Thomas
<i>E. pertinax</i>	AMNH163854	F	Lesser Antilles		St. Thomas
<i>E. pertinax</i>	AMNH163846	M	Lesser Antilles		St. Thomas
<i>E. pertinax</i>	AMNH163845	M	Lesser Antilles		St. Thomas
<i>E. pertinax</i>	AMNH163841	M	Lesser Antilles		St. Thomas
<i>E. pertinax</i>	AMNH163838	M	Lesser Antilles		St. Thomas
<i>E. pertinax</i>	AMNH163853	F	Lesser Antilles		St. Thomas
<i>E. pertinax</i>	AMNH163842	M	Lesser Antilles		St. Thomas
<i>E. pertinax</i>	AMNH163849	M	Lesser Antilles		St. Thomas
<i>E. pertinax</i>	AMNH474435	F	Lesser Antilles	Curaçao	Savonet
<i>E. pertinax</i>	AMNH163850	F	Lesser Antilles		St. Thomas
<i>E. pertinax</i>	AMNH163839	M	Lesser Antilles		St. Thomas
<i>E. pertinax</i>	AMNH163837	M	Lesser Antilles		St. Thomas
<i>E. pertinax</i>	AMNH474434	M	Lesser Antilles		Curaçao
<i>E. pertinax</i>	AMNH163847	F	Lesser Antilles		St. Thomas
<i>E. pertinax</i>	AMNH163852	F	Lesser Antilles		St. Thomas
<i>E. pertinax</i>	AMNH163843	M	Lesser Antilles		St. Thomas
<i>E. pertinax</i>	AMNH163857	F	Lesser Antilles		St. Thomas
<i>E. pertinax</i>	AMNH474436	F	Lesser Antilles	Curaçao	Savonet
<i>E. pertinax</i>	USNM327967	M	captivity	NA	NA
<i>E. pertinax</i>	USNM81004	NA	Lesser Antilles		St. Thomas
<i>E. pertinax</i>	USNM17759	NA	NA	NA	NA
<i>E. pertinax</i>	USNM17760	NA	Lesser Antilles		St. Thomas
<i>E. pertinax</i>	USNM354362	F	Lesser Antilles		St. Thomas
<i>E. pertinax</i>	USNM354358	M	Lesser Antilles		St. Thomas
<i>E. pertinax</i>	USNM26947	NA	Lesser Antilles		St. Thomas
<i>E. pertinax</i>	FMNH38021	F	Lesser Antilles		Curacao
<i>E. pertinax</i>	FMNH110303	M	Lesser Antilles		St.Thomas
<i>E. pertinax</i>	FMNH110300	M	Lesser Antilles		St.Thomas
<i>E. pertinax</i>	FMNH38023	F	Lesser Antilles		Curacao
<i>E. pertinax</i>	FMNH110301	M	Lesser Antilles		St.Thomas
<i>E. pertinax</i>	FMNH40281	M	Lesser Antilles		St.Thomas
<i>E. pertinax</i>	FMNH38024	M	Lesser Antilles		Curacao
<i>E. pertinax</i>	FMNH38272	F	Lesser Antilles		Curacao
<i>E. pertinax</i>	BMNH1914.12.1.415	M	Lesser Antilles		St. Thomas
<i>E. pertinax</i>	BMNH91.4.1.26	M	Lesser Antilles		St. Thomas
<i>E. pertinax</i>	BMNH1912.11.26.1	NA	Lesser Antilles		St. Thomas
<i>E. pertinax</i>	BMNH1914.12.1.417	M	Lesser Antilles		St. Thomas
<i>E. pertinax</i>	BMNH1859.10.11.1	NA	Lesser Antilles		St. Thomas

<i>E. xanthogenia</i>	AMNH474444	F	Lesser Antilles		Bonaire Island
<i>E. pertinax</i>	AMNH44708	NA	Lesser Antilles		St. Thomas
<i>E. xanthogenia</i>	AMNH474439	M	Lesser Antilles		Bonaire Island
<i>E. xanthogenia</i>	AMNH474443	M	Lesser Antilles		Bonaire Island
<i>E. xanthogenia</i>	AMNH47440	M	Lesser Antilles		Bonaire Island
<i>E. xanthogenia</i>	AMNH474442	M	Lesser Antilles		Bonaire Island
<i>E. xanthogenia</i>	AMNH174661	F	Lesser Antilles		Bonaire Island
<i>E. xanthogenia</i>	AMNH474445	F	Lesser Antilles	Bonaire Island	Rincon
<i>E. xanthogenia</i>	USNM153955	F	Lesser Antilles		Bonaire
<i>E. xanthogenia</i>	USNM208904	M	captivity		Natural Zoological Park
<i>E. xanthogenia</i>	USNM533661	F	Lesser Antilles		Bonaire
<i>E. xanthogenia</i>	USNM533663	F	Lesser Antilles		Bonaire
<i>E. xanthogenia</i>	USNM533660	M	Lesser Antilles		Bonaire
<i>E. xanthogenia</i>	USNM533664	M	Lesser Antilles		Bonaire
<i>E. xanthogenia</i>	USNM533659	F	Lesser Antilles		Bonaire
<i>E. xanthogenia</i>	USNM533662	M	Lesser Antilles		Bonaire
<i>E. xanthogenia</i>	FMNH38264	M	Lesser Antilles		Bonaire
<i>E. xanthogenia</i>	FMNH38266	F	Lesser Antilles		Bonaire
<i>E. xanthogenia</i>	FMNH38268	F	Lesser Antilles		Bonaire
<i>E. xanthogenia</i>	FMNH38265	F	Lesser Antilles		Bonaire
<i>E. xanthogenia</i>	FMNH38261	M	Lesser Antilles		Bonaire
<i>E. xanthogenia</i>	FMNH38271	M	Lesser Antilles		Bonaire
<i>E. xanthogenia</i>	FMNH38270	M	Lesser Antilles		Bonaire
<i>E. xanthogenia</i>	FMNH38262	F	Lesser Antilles		Bonaire
<i>E. paraensis</i>	AMNH802426	M	Brazil	Pará	Alto Tapajos
<i>E. paraensis</i>	MZUSP55719	M	Brazil	Pará	R. Cururu, Alto tapajos (margem direita)
<i>E. paraensis</i>	MNRJ28910	M	Brazil	Pará	Rio Cururu alto
<i>E. paraensis</i>	MNRJ28911	F	Brazil	Pará	Rio Cururu alto
<i>E. paraensis</i>	MNRJ30698	F	Brazil	Pará	Rio Cururu alto
<i>E. aeruginosa</i>	AMNH460110	M	Colombia	Meta	Villavicencio
<i>E. aeruginosa</i>	MZUSP43577	M	Colombia	Meta	Peralonso
<i>E. aeruginosa</i>	MZUSP43578	M	Colombia	Meta	Peralonso
<i>E. aeruginosa</i>	FMNH297429	M	Colombia	Meta	Carimagua
<i>E. aeruginosa</i>	FMNH297428	M	Colombia	Meta	Carimagua
<i>E. aeruginosa</i>	FMNH248529	M	Colombia	Meta	San Juan de Arama
<i>E. aeruginosa</i>	FMNH248528	F	Colombia	Meta	San Juan de Arama
<i>E. aeruginosa</i>	FMNH325419	F	captivity	NA	NA
<i>E. arubensis</i>	AMNH474446	M	Lesser Antilles		Aruba
<i>E. arubensis</i>	AMNH474447	F	Lesser Antilles		Aruba
<i>E. arubensis</i>	AMNH474448	M	Lesser Antilles		Aruba
<i>E. arubensis</i>	AMNH174660	F	Lesser Antilles		Aruba
<i>E. arubensis</i>	FMNH38119	F	Lesser Antilles		Aruba
<i>E. arubensis</i>	FMNH38115	F	Lesser Antilles		Aruba
<i>E. arubensis</i>	FMNH38117	F	Lesser Antilles		Aruba
<i>E. arubensis</i>	FMNH38120	M	Lesser Antilles		Aruba

<i>E. arubensis</i>	FMNH38116	M	Lesser Antilles		Aruba
<i>E. arubensis</i>	FMNH38121	M	Lesser Antilles		Aruba
<i>E. margaritensis</i>	AMNH474454	M	Venezuela	Orinoco	Altigracia
<i>E. margaritensis</i>	AMNH177098	F	Venezuela	Bolivar	Caicara
<i>E. margaritensis</i>	AMNH474475	M	Venezuela	St. of Cumana	Campos Alegre Valley
<i>E. margaritensis</i>	AMNH474476	NA	Venezuela		Cumana
<i>E. margaritensis</i>	AMNH73538	NA	Venezuela		Bermudez
<i>E. margaritensis</i>	AMNH150193	M	Venezuela	Falcon	Tucacas
<i>E. margaritensis</i>	AMNH474467	M	Venezuela	Orinoco river	Ciudad Bolivar
<i>E. margaritensis</i>	AMNH177099	M	Venezuela	Bolivar	Caicara
<i>E. margaritensis</i>	AMNH188159	F	Venezuela	Sucre	Cuchivano, 700 ft
<i>E. margaritensis</i>	AMNH177097	F	Venezuela	Orinoco river	Caicara
<i>E. margaritensis</i>	AMNH474463	M	Venezuela	Orinoco river	Maipures
<i>E. margaritensis</i>	AMNH150194	M	Venezuela	Estado Lara	El Cuji
<i>E. margaritensis</i>	AMNH437234	F	Venezuela	Bolivar	Caicara
<i>E. margaritensis</i>	AMNH76091	F	Venezuela	Bolivar	Suapure
<i>E. margaritensis</i>	AMNH150192	M	Venezuela	Estado Falcon	Tucacas
<i>E. margaritensis</i>	USNM389627	M	Venezuela	Aragua	El Limón
<i>E. margaritensis</i>	USNM88480	M	Venezuela	Puerto Cabello	San Esteban
<i>E. margaritensis</i>	USNM329503	M	Venezuela	Anzoategui	Soledad
<i>E. margaritensis</i>	USNM329504	M	Venezuela	Anzoategui	Soledad
<i>E. margaritensis</i>	USNM351884	M	Venezuela	Julian Mellado	El Sombrero
<i>E. margaritensis</i>	USNM354365	M	Venezuela	Aragua	Maracay
<i>E. margaritensis</i>	USNM316400	M	Venezuela	Anzoategui	Soledad
<i>E. aeruginosa</i>	USNM389626	M	Venezuela	Aragua	Pie del Serro
<i>E. margaritensis</i>	USNM533833	F	Venezuela	Trujillo	Agua Santa, 23 mi NW Valera
<i>E. margaritensis</i>	FMNH110299	F	Venezuela	Aragua	Maracay
<i>E. margaritensis</i>	FMNH91863	M	Venezuela	Sucre	Cocollar
<i>E. chrysophrys</i>	FMNH45053	M	Brazil	Amazonas	Boa Vista, Rio Branco
<i>E. margaritensis</i>	FMNH91865	F	Venezuela	Sucre	Cocollar
<i>E. margaritensis</i>	FMNH34496	F	Venezuela	Lake Valencia	Aragua
<i>E. margaritensis</i>	FMNH34495	F	Venezuela	Aragua	Maracay
<i>E. margaritensis</i>	FMNH91862	F	Venezuela	Sucre	Cocollar
<i>E. margaritensis</i>	FMNH34487	M	Venezuela	Aragua	Maracay
<i>E. margaritensis</i>	BMNH1904.5.29.61	F	Venezuela		Gulf of Cariaco
<i>E. margaritensis</i>	BMNH1904.5.29.62	M	Venezuela	Sucre	Laguna Grande del Obispo
<i>E. margaritensis</i>	BMNH1904.5.29.59	NA	Venezuela		Gulf of Cariaco
<i>E. margaritensis</i>	BMNH1904.5.29.63	NA	Venezuela		Gulf of Cariaco
<i>E. margaritensis</i>	FMNH39151	M	Venezuela	Nueva Esparta	Margarita Island
<i>E. margaritensis</i>	BMNH1904.5.29.91	NA	Venezuela	Nueva Esparta	Margarita Island
<i>E. margaritensis</i>	BMNH1914.12.1.418	M	Venezuela	Nueva Esparta	Margarita Island
<i>E. margaritensis</i>	BMNH1965.36.14	F	Venezuela	Calabozo	Estacion biologica de los Llanos
<i>E. margaritensis</i>	BMNH1904.5.29.90	NA	Venezuela	Nueva Esparta	Margarita Island
<i>E. margaritensis</i>	AMNH474451	F	Venezuela	Nueva Esparta	Margarita Island
<i>E. margaritensis</i>	AMNH174663	M	Venezuela	Nueva Esparta	Margarita Island

<i>E. margaritensis</i>	AMNH474453	NA	Venezuela	Nueva Esparta	Margarita Island
<i>E. margaritensis</i>	AMNH174662	M	Venezuela	Nueva Esparta	Margarita Island
<i>E. margaritensis</i>	AMNH474452	F	Venezuela	Nueva Esparta	Margarita Island
<i>E. margaritensis</i>	AMNH174665	F	Venezuela	Nueva Esparta	Margarita Island
<i>E. margaritensis</i>	AMNH474450	M	Venezuela	Nueva Esparta	Margarita Island
<i>E. margaritensis</i>	AMNH174664	F	Venezuela	Nueva Esparta	Margarita Island
<i>E. margaritensis</i>	USNM151665	M	Venezuela	Nueva Esparta	Margarita Island
<i>E. margaritensis</i>	USNM151666	F	Venezuela	Nueva Esparta	Margarita Island
<i>E. margaritensis</i>	USNM309513	M	Venezuela	Nueva Esparta	Margarita Island
<i>E. margaritensis</i>	USNM151664	M	Venezuela	Nueva Esparta	Margarita Island
<i>E. margaritensis</i>	FMNH39149	F	Venezuela	Nueva Esparta	Margarita Island
<i>E. margaritensis</i>	FMNH39154	M	Venezuela	Nueva Esparta	Margarita Island
<i>E. margaritensis</i>	FMNH39138	M	Venezuela	Nueva Esparta	Margarita Island
<i>E. margaritensis</i>	FMNH39139	F	Venezuela	Nueva Esparta	Margarita Island
<i>E. margaritensis</i>	FMNH39144	F	Venezuela	Nueva Esparta	Margarita Island
<i>E. margaritensis</i>	FMNH39156	F	Venezuela	Nueva Esparta	Margarita Island
<i>E. margaritensis</i>	FMNH39137	F	Venezuela	Nueva Esparta	Margarita Island
<i>E. margaritensis</i>	FMNH39142	M	Venezuela	Nueva Esparta	Margarita Island
<i>E. tortugensis</i>	FMNH36976	M	Venezuela	Tortuga Island	
<i>E. tortugensis</i>	AMNH174657	F	Venezuela	Tortuga Island	
<i>E. tortugensis</i>	AMNH174658	F	Venezuela	Tortuga Island	
<i>E. tortugensis</i>	AMNH174656	M	Venezuela	Tortuga Island	
<i>E. tortugensis</i>	AMNH174659	F	Venezuela	Tortuga Island	
<i>E. tortugensis</i>	FMNH39111	M	Venezuela	Tortuga Island	
<i>E. tortugensis</i>	FMNH39113	NA	Venezuela	Tortuga Island	
<i>E. tortugensis</i>	FMNH39115	F	Venezuela	Tortuga Island	
<i>E. tortugensis</i>	FMNH39121	M	Venezuela	Tortuga Island	
<i>E. tortugensis</i>	FMNH39133	F	Venezuela	Tortuga Island	
<i>E. tortugensis</i>	FMNH39120	F	Venezuela	Tortuga Island	
<i>E. tortugensis</i>	FMNH39129	F	Venezuela	Tortuga Island	
<i>E. tortugensis</i>	FMNH39112	F	Venezuela	Tortuga Island	
<i>E. aeruginosa</i>	CM44695	M	Colombia		Rio Hacha
<i>E. aeruginosa</i>	MZUSP13528	M	Colombia	Magdalena River	NA
<i>E. margaritensis</i>	MZUSP5674	M	Venezuela	Guanoco	NA
<i>E. aeruginosa</i>	AMNH133011	M	Colombia	lower Magdalena River	
<i>E. margaritensis</i>	AMNH474470	NA	Venezuela		San Carlos
<i>E. margaritensis</i>	AMNH474471	NA	Venezuela		San Carlos
<i>E. surinama</i>	AMNH48257	F	Suriname		Saramacca river
<i>E. aeruginosa</i>	AMNH133012	M	Colombia	Barranquilla	La Playa
<i>E. surinama</i>	AMNH48257	M	Suriname		Saramacca river
<i>E. aeruginosa</i>	AMNH474449	NA	NA	NA	NA
<i>E. aeruginosa</i>	AMNH121463	M	Colombia	Magdalena River	
<i>E. aeruginosa</i>	AMNH121460	NA	Colombia	Magdalena River	

<i>E. aeruginosa</i>	AMNH121461	M	Colombia	Magdalena River	
<i>E. aeruginosa</i>	AMNH133013	M	Colombia	Barranquilla	La Playa
<i>E. aeruginosa</i>	AMNH133015	F	Colombia	Barranquilla	La Playa
<i>E. aeruginosa</i>	AMNH44706	NA	NA	NA	NA
<i>E. aeruginosa</i>	AMNH121464	F	Colombia	Magdalena River	Calamar, 50 ft
<i>E. aeruginosa</i>	AMNH121465	M	Colombia	Magdalena River	Calamar, 50 ft
<i>E. aeruginosa</i>	USNM383480	M	Colombia	Magdalena	Distraccion
<i>E. aeruginosa</i>	USNM383481	F	Colombia	Magdalena	Distraccion
<i>E. aeruginosa</i>	USNM383479	M	Colombia	Sierra Nevada, Santa Marta	Atanguez
<i>E. aeruginosa</i>	USNM383475	F	Colombia	Magdalena	El Conejo
<i>E. aeruginosa</i>	USNM383476	F	Colombia	Sierra Nevada, Santa Marta	Atanguez
<i>E. aeruginosa</i>	USNM383478	M	Colombia	Sierra Nevada, Santa Marta	Atanguez
<i>E. aeruginosa</i>	USNM372600	M	Colombia	Magdalena	La Gloria, Puerto Sagoc
<i>E. aeruginosa</i>	USNM372599	F	Colombia	Magdalena	La Gloria, Puerto Sagoc
<i>E. aeruginosa</i>	USNM368669	M	Colombia		Puerto Estrella
<i>E. aeruginosa</i>	USNM368668	M	Colombia		Rioacha
<i>E. aeruginosa</i>	FMNH50920	F	Colombia	Barranquilla	La Playa
<i>E. aeruginosa</i>	FMNH72325	M	Colombia	Bolivar	Lorica
<i>E. aeruginosa</i>	FMNH72326	F	Colombia	Bolivar	Lorica
<i>E. aeruginosa</i>	FMNH190747	F	Colombia	Antioquia	Nechi
<i>E. aeruginosa</i>	FMNH43290	M	Venezuela	Zulia	Rio Aurara
<i>E. aeruginosa</i>	FMNH34490	M	Venezuela	Zulia	Encontrados
<i>E. aeruginosa</i>	FMNH34492	F	Venezuela	Zulia	Encontrados
<i>E. aeruginosa</i>	FMNH34489	M	Venezuela	Zulia	Encontrados
<i>E. aeruginosa</i>	BMNH89.1.30.111	NA	Colombia	Magdalena Valley	Ciénaga
<i>E. surinama</i>	BMNH57.3.15.7	NA	Lesser Antilles		Trinidad
<i>E. chrysophrys</i>	MNHN433	F	Venezuela		Roraima
<i>E. chrysophrys</i>	MNHN432	M	Venezuela		Roraima
<i>E. surinama</i>	MNHN2003_2525	M	Lesser Antilles		Trinidad
<i>E. chrysophrys</i>	MNHN434	M	Venezuela		Roraima
<i>E. chrysophrys</i>	MNHN435	F	Venezuela		Roraima
<i>E. surinama</i>	MNHN437	M	Lesser Antilles		Trinidad
<i>E. ocularis</i>	BMNH1889.1.30.116	M	Panama		Isthmus of Panama
<i>E. ocularis</i>	AMNH77443	M	Panama	Chiriquiri	Boqueron
<i>E. ocularis</i>	AMNH106353	F	Panama	Chiriqui	Boqueron
<i>E. ocularis</i>	AMNH233120	F	Panama	Mala Peninsula	Cerro Largo
<i>E. ocularis</i>	AMNH1066352	M	Panama	Chiriqui	Boqueron
<i>E. ocularis</i>	AMNH186682	F	Panama	Veraguas, 15 mi SE of Santiago	El Villano
<i>E. ocularis</i>	AMNH186684	M	Panama	Veraguas, 15 mi SE of Santiago	El Villano

<i>E. ocularis</i>	AMNH233121	M	Panama	Cape Mala Peninsula	Cerro Largo
<i>E. ocularis</i>	AMNH247135	F	Panama	Coclé	Aguadulce
<i>E. ocularis</i>	AMNH186683	F	Panama	Veraguas, 15 mi SE of Santiago	El Villano
<i>E. ocularis</i>	AMNH183064	F	Panama	Veraguas, Santiago	La Colorada
<i>E. ocularis</i>	AMNH233119	M	Panama	Cape Mala Peninsula	Cerro Largo
<i>E. ocularis</i>	AMNH474504	F	Panama		Brava Island
<i>E. ocularis</i>	AMNH44693	M	Panama	NA	NA
<i>E. ocularis</i>	AMNH183065	F	Panama	Veraguas, Santiago	La Colorada
<i>E. ocularis</i>	AMNH474510	M	Panama	NA	NA
<i>E. ocularis</i>	AMNH183063	F	Panama	Veraguas, Santiago	La Colorada
<i>E. ocularis</i>	AMNH474508	NA	Panama	Chiriqui	Boqueti
<i>E. ocularis</i>	AMNH247134	M	Panama	Coclé	Aguadulce
<i>E. ocularis</i>	AMNH44694	F	Panama	NA	NA
<i>E. ocularis</i>	AMNH474512	M	Panama	NA	NA
<i>E. ocularis</i>	AMNH474511	M	Panama	Coclé	Nata
<i>E. ocularis</i>	AMNH47444	F	Panama	Chiriqui	Boqueron
<i>E. ocularis</i>	USNM476642	M	Panama	Coclé	El Potrero
<i>E. ocularis</i>	USNM400247	M	Panama		Parita
<i>E. ocularis</i>	USNM188410	F	Panama		Divalá
<i>E. ocularis</i>	USNM400246	F	Panama		Parita
<i>E. ocularis</i>	USNM400248	F	Panama		Parita
<i>E. ocularis</i>	USNM188411	M	Panama		Divalá
<i>E. ocularis</i>	USNM461814	F	Panama	Pedasí	Los Santos
<i>E. ocularis</i>	USNM476643	F	Panama	Coclé	El Potrero
<i>E. ocularis</i>	USNM477607	F	Panama	Coclé	Aguadulce
<i>E. ocularis</i>	USNM532994	M	Panama	Porto Armurelles	Chiriquí
<i>E. ocularis</i>	LSUMZJTW550	M	Panama	Cocle	SW Anton between Rosario and Pacific ocean, 40 m
<i>E. ocularis</i>	FMNH19639	F	Panama	Chiriqui	Boqueron
<i>E. ocularis</i>	FMNH355159	F	Panama	NA	NA
<i>E. ocularis</i>	FMNH355160	M	captivity	Kansas	Busch Gardens
<i>E. ocularis</i>	FMNH40319	NA	Panama	Cocle	Aguadulce
<i>E. ocularis</i>	BMNH89.1.30.113	M	Panama	Veragua	Calobre
<i>E. ocularis</i>	BMNH89.1.30.117	F	Panama		Isthmus of Panama
<i>E. ocularis</i>	BMNH90.6.1.62	NA	Panama	Veragua	NA
<i>E. ocularis</i>	BMNH72.2.8.7	F	Panama	Veragua	NA
<i>E. ocularis</i>	MNHN249	NA	Panama	Porto Armurelles	Chiriquí
<i>E. ocularis</i>	MNHN250	NA	Panama	Porto Armurelles	Chiriquí
<i>E. ocularis</i>	MNHN252	NA	Panama	Porto Armurelles	Chiriquí

<i>E. ocularis</i>	MNHN251	NA	Panama	Porto Armurelles	Chiriquí
<i>E. ocularis</i>	MNHN464	NA	Panama	Porto Armurelles	Chiriquí
<i>E. ocularis</i>	MNHN248	NA	Panama	Porto Armurelles	Chiriquí
<i>E. surinama</i>	AMNH474483	M	Suriname	NA	NA
<i>E. surinama</i>	AMNH474482	NA	Suriname		Paramaribo
<i>E. surinama</i>	AMNH474479	F	Suriname		Paramaribo
<i>E. surinama</i>	AMNH177102	M	Venezuela	Monagas	Las Barrancas
<i>E. surinama</i>	AMNH474478	M	Suriname		Paramaribo
<i>E. surinama</i>	AMNH474481	NA	Suriname		Paramaribo
<i>E. surinama</i>	AMNH474480	F	Suriname		Paramaribo
<i>E. surinama</i>	FMNH108130	NA	Guyana	Buxton	East Coast
<i>E. surinama</i>	FMNH91864	M	Venezuela	Delta Amacuro	Piacoa
<i>E. surinama</i>	FMNH190576	F	Guyana		Abary River
<i>E. surinama</i>	FMNH190577	M	Guyana		Abary River
<i>E. surinama</i>	FMNH108135	M	Guyana	Buxton	East Coast
<i>E. surinama</i>	FMNH108132	M	Guyana	Buxton	East Coast
<i>E. surinama</i>	FMNH32211	M	Guyana		Georgetown
<i>E. surinama</i>	FMNH108129	F	Guyana	Buxton	East Coast
<i>E. surinama</i>	BMNH1902.10.31.2	F	Suriname		Paramaribo
<i>E. surinama</i>	BHMNH90.6.1.64	NA	French Guiana	NA	NA
<i>E. chrysophrys</i>	AMNH474485	M	Guyana		Annai
<i>E. chrysophrys</i>	AMNH474489	M	Guyana		Annai
<i>E. chrysophrys</i>	AMNH236351	F	Brazil	Rio Surumu	Frechal
<i>E. chrysophrys</i>	AMNH236347	M	Brazil	Rio Surumu	Frechal
<i>E. chrysophrys</i>	AMNH236346	F	Brazil	Rio Cotinga	Limao
<i>E. chrysophrys</i>	AMNH44709	NA	NA	NA	NA
<i>E. chrysophrys</i>	AMNH474487	F	Guyana		Annai
<i>E. chrysophrys</i>	AMNH474490	F	Guyana	NA	NA
<i>E. chrysophrys</i>	AMNH474491	M	Guyana	NA	NA
<i>E. chrysophrys</i>	AMNH44707	NA	NA	NA	NA
<i>E. chrysophrys</i>	AMNH236348	M	Brazil	Rio Surumu	Frechal
<i>E. chrysophrys</i>	AMNH236345	M	Brazil	Rio Cotinga	Limao
<i>E. chrysophrys</i>	AMNH236349	M	Brazil	Rio Surumu	Frechal
<i>E. chrysophrys</i>	AMNH474488	F	Guyana		Roraima
<i>E. chrysophrys</i>	AMNH474484	M	Guyana		Annai
<i>E. chrysophrys</i>	AMNH236350	F	Brazil	Rio Surumu	Frechal
<i>E. chrysophrys</i>	AMNH474486	F	Guyana		Annai
<i>E. chrysophrys</i>	MZUSP55820	M	Brazil	Roraima	Faz. Mucajai , Rio Mucajai, Tributário do Rio Branco
<i>E. chrysophrys</i>	MZUSP55821	F	Brazil	Roraima	Faz. Mucajai , Rio Mucajai, Tributário do Rio Branco
<i>E. chrysophrys</i>	MZUSP55822	F	Brazil	Roraima	Baixo Mucajá, afl. Rio Branco, Sul de Boa Vista
<i>E. chrysophrys</i>	MZUSP55823	M	Brazil	Roraima	Baixo Mucajá, afl. Rio Branco, Sul de Boa Vista

<i>E. chrysophrys</i>	MZUSP55824	F	Brazil	Roraima	Baixo Mucajaí, afl. Rio Branco, Sul de Boa Vista
<i>E. chrysophrys</i>	MZUSP55825	F	Brazil	Roraima	Baixo Mucajaí, afl. Rio Branco, Sul de Boa Vista
<i>E. chrysophrys</i>	MZUSP77937	M	Brazil	Roraima	Faz. Santa Teresa, Boa Vista
<i>E. chrysophrys</i>	MZUSP77938	M	Brazil	Roraima	Faz. Santa Teresa, Boa Vista
<i>E. chrysophrys</i>	MZUSP79090	F	Brazil	Roraima	Faz. Encrenca, Amajari
<i>E. chrysophrys</i>	USNM627450	M	Guyana		Abary River
<i>E. chrysophrys</i>	USNM625359	M	Guyana		Abary River
<i>E. chrysophrys</i>	USNM627403	F	Guyana	South Rupununi Savannah	Kusad Mountain, NE flank
<i>E. chrysophrys</i>	USNM626224	F	Guyana	East Rupununi Savannah	Wiwitau Mountain
<i>E. chrysophrys</i>	USNM632844	M	Guyana	Upper Takutu-Upper Essequibo	Karasabai, ca 17 km SSW at Ireng River
<i>E. surinama</i>	USNM145669	NA	Lesser Antilles		Trinidad
<i>E. margaritensis</i>	USNM329505	M	Venezuela	Bolivar	Bolivar
<i>E. surinama</i>	USNM145668	NA	Lesser Antilles		Trinidad
<i>E. surinama</i>	USNM145667	NA	Lesser Antilles		Trinidad
<i>E. chrysophrys</i>	LSUMZ175331	F	Guyana	Ireng River	17 km SW Karasabai
<i>E. chrysophrys</i>	FMNH108131	F	Guyana	Essequibo River	Rockstone
<i>E. chrysophrys</i>	FMNH371840	M	Guyana	Essequibo River	Dawa
<i>E. chrysophrys</i>	FMNH108133	F	Guyana	Essequibo River	Rockstone
<i>E. chrysophrys</i>	FMNH108134	F	Guyana	Essequibo River	Rockstone
<i>E. chrysophrys</i>	FMNH188826	F	NA	NA	Agua Blanca
<i>E. chrysophrys</i>	FMNH45051	M	Brazil	Amazonas	Boa Vista; Rio Branco
<i>E. chrysophrys</i>	FMNH45052	F	Brazil	Amazonas	Boa Vista; Rio Branco
<i>E. chrysophrys</i>	FMNH45050	M	Brazil	Amazonas	Serra Grande, Rio Branco
<i>E. chrysophrys</i>	BMNH92.1.16.63	M	Guyana		Quonga
<i>E. chrysophrys</i>	BMNH89.1.30.120	M	Guyana		Roraima, 3500 ft
<i>E. chrysophrys</i>	BMNH1922.3.5.1214	NA	Guyana		Upper Takutu
<i>E. chrysophrys</i>	BMNH92.1.16.62	NA	Guyana		Quonga
<i>E. chrysophrys</i>	BMNH95.11.28.140	F	Guyana		NA
<i>E. chrysophrys</i>	BMNH40.7.3.71	NA	Guyana		NA
<i>E. chrysophrys</i>	BMNH1922.3.5.1217	NA	Guyana		Bonastica River
<i>E. chrysophrys</i>	BMNH89.1.30.121	F	Guyana		Roraima, 3500 ft
<i>E. chrysophrys</i>	BMNH90.6.1.57	NA	Guyana		Roraima
<i>E. chrysophrys</i>	ANSP22333	NA	Colombia	NA	NA
<i>E. chrysophrys</i>	AMNH310235	M	Brazil	Rio Negro	Yavanari
<i>E. chrysophrys</i>	AMNH310237	F	Brazil	Rio Negro	Yavanari
<i>E. chrysophrys</i>	AMNH310234	M	Brazil	Rio Negro	Yavanari
<i>E. chrysophrys</i>	AMNH310..	M	Brazil	Rio Negro	Yavanari
<i>E. chrysophrys</i>	AMNH310233	F	Brazil	Rio Negro	Tabocal

<i>E. chrysophrys</i>	MZUSP93616	M	Brazil	Amazonas	Barcelos, rio Jufari, "Ilha da Campina"
<i>E. chrysophrys</i>	USNM328375	M	Venezuela	Upper Orinoco	Cerro Yapacana
<i>E. chrysophrys</i>	BMNH90.6.1.65	NA	Brazil	Rio Negro	NA
<i>E. chrysophrys</i>	BMNH59.11.22.7	NA	Brazil	Rio Negro	NA
<i>E. aeruginosa</i>	USNM410668	F	Colombia	Cordoba, Rio Sinú	Tierra Alta
<i>E. aeruginosa</i>	ANSP160393	NA	Colombia	Bolivar	Tierra Alta
<i>T. acuticaudatus</i>	MACN4320	M	Argentina	NA	Salta
<i>T. acuticaudatus</i>	MACN8990	M	Argentina	General Roca	Cordoba
<i>T. acuticaudatus</i>	MZUSP3937	M	Argentina	NA	San Luís
<i>T. acuticaudatus</i>	AMNH474309	F	Argentina	Tucuman	Bosque
<i>T. acuticaudatus</i>	MACN2248a	M	Argentina	Formosa	Comandante Fontana
<i>T. acuticaudatus</i>	MACN2530a	F	Argentina	Salta	Macapillo
<i>T. acuticaudatus</i>	AMNH474316	F	Argentina	Tucuman	NA
<i>T. acuticaudatus</i>	AMNH474311	M	Argentina	Tucuman	Tapia
<i>T. acuticaudatus</i>	AMNH140637	M	Argentina	Santiago del Estero	Lavalle
<i>T. acuticaudatus</i>	AMNH474310	M	Argentina	Tucuman	Tapia
<i>T. acuticaudatus</i>	AMNH140631	M	Argentina	Santiago del Estero	Suncho Corral
<i>T. acuticaudatus</i>	AMNH140634	M	Argentina	Santiago del Estero	Suncho Corral
<i>T. acuticaudatus</i>	AMNH140632	M	Argentina	Santiago del Estero	Suncho Corral
<i>T. acuticaudatus</i>	USNM283746	M	Argentina	182 km from Formosa	Riacho Pilaga
<i>T. acuticaudatus</i>	USNM283745	M	Argentina	Pampa	Victorica
<i>T. acuticaudatus</i>	USNM283747	M	Argentina	182 km from Formosa	Riacho Pilaga
<i>T. acuticaudatus</i>	USNM284858	F	Argentina	Tucuman	Tapia
<i>T. acuticaudatus</i>	USNM284837	F	Argentina	Tucuman	Tapia
<i>T. acuticaudatus</i>	LSUMZ54051	F	Argentina	Corrientes	San Luis del Palmar. Ea. Garabata'
<i>T. acuticaudatus</i>	LSUMZ54058	M	Argentina	Corrientes	San Luis del Palmar. Ea. Garabata'
<i>T. acuticaudatus</i>	LSUMZ54057	F	Argentina	Corrientes	San Luis del Palmar. Ea. Garabata'
<i>T. acuticaudatus</i>	LSUMZ54050	F	Argentina	Corrientes	San Luis del Palmar. Ea. Garabata'
<i>T. acuticaudatus</i>	LSUMZ54054	F	Argentina	Corrientes	San Luis del Palmar. Ea. Garabata'
<i>T. acuticaudatus</i>	LSUMZ54055	M	Argentina	Corrientes	San Luis del Palmar. Ea. Garabata'
<i>T. acuticaudatus</i>	LSUMZ54052	M	Argentina	Corrientes	San Luis del Palmar. Ea. Garabata'

<i>T. acuticaudatus</i>	LSUMZ54047	M	Argentina	Corrientes	San Luis del Palmar. Ea. Garabata'
<i>T. acuticaudatus</i>	LSUMZ54049	F	Argentina	Corrientes	San Luis del Palmar. Ea. Garabata'
<i>T. acuticaudatus</i>	LSUMZ54056	F	Argentina	Corrientes	San Luis del Palmar. Ea. Garabata'
<i>T. acuticaudatus</i>	LSUMZ54046	M	Argentina	Corrientes	San Luis del Palmar. Ea. Garabata'
<i>T. acuticaudatus</i>	LSUMZ54048	M	Argentina	Corrientes	San Luis del Palmar. Ea. Garabata'
<i>T. acuticaudatus</i>	LSUMZ54053	F	Argentina	Corrientes	San Luis del Palmar. Ea. Garabata'
<i>T. acuticaudatus</i>	NMHN244	F	Argentina	NA	Mocovi
<i>T. acuticaudatus</i>	NMHN242	NA	Argentina	Tucuman	Santa Ana
<i>T. acuticaudatus</i>	NMHN243	NA	NA	NA	NA
<i>T. acuticaudatus</i>	USNM390721	F	NA	NA	NA
<i>T. acuticaudatus</i>	FMNH64349	M	Brazil	Mato Grosso do Sul	Urucum de Corumba
<i>T. acuticaudatus</i>	FMNH64348	F	Brazil	Mato Grosso do Sul	Urucum de Corumba
<i>T. acuticaudatus</i>	FMNH64347	F	Brazil	Mato Grosso do Sul	Urucum de Corumba
<i>T. haemorrhous</i>	FMNH110555	F	Brazil	Mato Grosso do Sul	Vaccaria. faz.Capão Bonita
<i>T. haemorrhous</i>	FMNH110554	M	Brazil	Mato Grosso do Sul	Vaccaria. faz.Capão Bonita
<i>T. haemorrhous</i>	FMNH110556	M	Brazil	Mato Grosso do Sul	Vaccaria. faz.Capão Bonita
<i>T. acuticaudatus</i>	FMNH152321	M	Paraguay	Chaco	NA
<i>T. acuticaudatus</i>	FMNH152835	M	Paraguay	Chaco	Guachalla. Rio Pilcomayo
<i>T. acuticaudatus</i>	BMNH1846.9.9.38	NA	Bolivia	NA	NA
<i>T. acuticaudatus</i>	AMNH474328	F	Bolivia	Province of Sara	NA
<i>T. acuticaudatus</i>	FMNH179076	M	Bolivia	Santa Cruz	Comarapa
<i>T. acuticaudatus</i>	LSUMZ168728	M	Bolivia	Santa Cruz	Mina Don Mario. 12.6 km ENE San José de Chiquitos
<i>T. acuticaudatus</i>	LSUMZ37251	M	Bolivia	Santa Cruz	Buena Vista. Ischilo. 400 m
<i>T. acuticaudatus</i>	LSUMZ168721	M	Bolivia	Santa Cruz	Mina Don Mario. 12.6 km ENE San José de Chiquitos
<i>T. acuticaudatus</i>	LSUMZ168729	M	Bolivia	Santa Cruz	Mina Don Mario. 12.6 km ENE San José de Chiquitos
<i>T. acuticaudatus</i>	LSUMZ168726	F	Bolivia	Santa Cruz	Mina Don Mario. 12.6 km ENE San José de Chiquitos
<i>T. acuticaudatus</i>	LSUMZ168727	M	Bolivia	Santa Cruz	Mina Don Mario. 12.6 km

					ENE San José de Chiquitos
<i>T. acuticaudatus</i>	LSUMZNMK1793	F	Bolivia	Santa Cruz	Mina Don Mario. 12.6 km ENE San José de Chiquitos
<i>T. acuticaudatus</i>	LSUMZNMK1775	F	Bolivia	Santa Cruz	Mina Don Mario. 12.6 km ENE San José de Chiquitos
<i>T. acuticaudatus</i>	LSUMZNMK1794	F	Bolivia	Santa Cruz	Mina Don Mario. 12.6 km ENE San José de Chiquitos
<i>T. acuticaudatus</i>	MACN8972	M	Bolivia	Santa Cruz	Buenavista
<i>T. acuticaudatus</i>	MACN37489	F	Bolivia	Santa Cruz	Buena Vista
<i>T. acuticaudatus</i>	CMP32773	NA	Bolivia	Santa Cruz	Santa Cruz
<i>T. acuticaudatus</i>	CMP32776	NA	Bolivia	Santa Cruz	Santa Cruz
<i>T. acuticaudatus</i>	CMP32779	NA	Bolivia	Santa Cruz	Santa Cruz
<i>T. acuticaudatus</i>	CMP43594	NA	Bolivia	Santa Cruz	Santa Cruz
<i>T. acuticaudatus</i>	CMP43612	NA	Bolivia	Santa Cruz	Santa Cruz
<i>T. acuticaudatus</i>	CMP51432	NA	Bolivia	Santa Cruz	Buena Vista
<i>T. acuticaudatus</i>	CMP51433	NA	Bolivia	Santa Cruz	Buena Vista
<i>T. acuticaudatus</i>	CMP51434	NA	Bolivia	Santa Cruz	Buena Vista
<i>T. acuticaudatus</i>	CMP51436	NA	Bolivia	Santa Cruz	Buena Vista
<i>T. acuticaudatus</i>	CMP120044	NA	Bolivia	Santa Cruz	Buena Vista. Rio Surutu
<i>T. acuticaudatus</i>	CMP51435	NA	Bolivia	Santa Cruz	Buena Vista
<i>T. acuticaudatus</i>	LSUMZ35772	M	Bolivia	Santa Cruz	Buena Vista. Ischilo. 400 m
<i>T. acuticaudatus</i>	LSUMZ171164	F	Bolivia	Santa Cruz	Cordillera 38 km E Abapo'
<i>T. acuticaudatus</i>	LSUMZ37252	M	Bolivia	Santa Cruz	Buena Vista. Ischilo. 400 m
<i>T. acuticaudatus</i>	CMP120045	NA	Bolivia	Santa Cruz	Buena Vista. Rio Surutu
<i>T. acuticaudatus</i>	FMNH179085	M	Bolivia	Santa Cruz	Cercado. 450 m
<i>T. acuticaudatus</i>	FMNH179087	F	Bolivia	Santa Cruz	Buenavista
<i>T. acuticaudatus</i>	FMNH179086	F	Bolivia	Santa Cruz	Buenavista
<i>T. acuticaudatus</i>	LSUMZ123504	M	Bolivia	Santa Cruz	Caballero. 2.5 km N Tambo. Rio San Isidro (Rio Pulquina). 1525 m
<i>T. acuticaudatus</i>	FMNH179073	NA	Bolivia	NA	NA
<i>T. acuticaudatus</i>	FMNH179084	F	Bolivia	NA	NA
<i>T. acuticaudatus</i>	AMNH139075	M	Bolivia	Cochabamba	Tujma
<i>T. acuticaudatus</i>	CMP120166	NA	Bolivia	Santa Cruz	Comarapa
<i>T. acuticaudatus</i>	FMNH179084	M	Bolivia	Cochabamba	Aiquile. 2150 m
<i>T. acuticaudatus</i>	FMNH179079	F	Bolivia	Santa Cruz	Comarapa
<i>T. acuticaudatus</i>	FMNH179075	M	Bolivia	Santa Cruz	Comarapa
<i>T. acuticaudatus</i>	FMNH179076	M	Bolivia	Santa Cruz	Comarapa
<i>T. acuticaudatus</i>	FMNH179074	M	Bolivia	Santa Cruz	Comarapa
<i>T. acuticaudatus</i>	FMNH179082	F	Bolivia	Cochabamba	Aiquile. 2150 m
<i>T. acuticaudatus</i>	FMNH179078	M	Bolivia	Cochabamba	Aiquile. 2150 m
<i>T. acuticaudatus</i>	FMNH179081	F	Bolivia	Cochabamba	Aiquile. 2150 m

<i>T. acuticaudatus</i>	NMHN211	M	Bolivia	Cochabamba	Aiquile. 2150 m
<i>T. haemorrhous</i>	FMNH37454	M	Venezuela	Margarita Island	Boca del Rio
<i>T. haemorrhous</i>	FMNH39136	F	Venezuela	Nueva Esparta	Margarita Island. Boca del Rio
<i>T. haemorrhous</i>	AMNH325206	M	Venezuela	Caracas	Boca del Rio Margarita
<i>T. haemorrhous</i>	MZUSP11336	M	Brazil	NA	NA
<i>T. haemorrhous</i>	AMNH474336	F	captivity	NA	NA
<i>T. haemorrhous</i>	AMNH156468	F	captivity	NA	NA
<i>T. haemorrhous</i>	AMNH96544	M	captivity	NA	NA
<i>T. haemorrhous</i>	USNM190312	F	captivity	NA	NA
<i>T. haemorrhous</i>	ZSM B29	NA	Brazil	Bahia	Campo Alegre
<i>T. haemorrhous</i>	ZSM B29a	NA	Brazil	Bahia	Campo Alegre
<i>T. haemorrhous</i>	MZUSP79513	F	Brazil	Tocantins	ESEC Serra Geral do Tocantins
<i>T. haemorrhous</i>	MZUSP79514	F	Brazil	Tocantins	ESEC Serra Geral do Tocantins
<i>T. haemorrhous</i>	MZUSP79515	M	Brazil	Tocantins	ESEC Serra Geral do Tocantins
<i>T. haemorrhous</i>	MZUSP79516	NA	Brazil	Tocantins	ESEC Serra Geral do Tocantins
<i>T. haemorrhous</i>	MZUSP79517	F	Brazil	Tocantins	ESEC Serra Geral do Tocantins
<i>T. haemorrhous</i>	MZUSP79518	M	Brazil	Tocantins	ESEC Serra Geral do Tocantins
<i>T. haemorrhous</i>	MZUSP79519	F	Brazil	Tocantins	ESEC Serra Geral do Tocantins
<i>T. haemorrhous</i>	MZUSP79520	M	Brazil	Tocantins	ESEC Serra Geral do Tocantins
<i>T. haemorrhous</i>	MZUSP7319	M	Brazil	Bahia	Juazeiro
<i>T. haemorrhous</i>	MZUSP40848	F	Brazil	Bahia	Buritirama. Mun. de Barra
<i>T. haemorrhous</i>	MZUSP40849	M	Brazil	Bahia	Santa Rita de Cassia. Rio Preto
<i>T. haemorrhous</i>	MZUSP40850	F	Brazil	Bahia	Santa Rita de Cassia. Rio Preto
<i>T. haemorrhous</i>	MZUSP40851	F	Brazil	Bahia	Barra. Rio Sao Francisco
<i>T. haemorrhous</i>	AMNH241668	M	Brazil	Bahia	Santa Rita
<i>T. haemorrhous</i>	AMNH241658	M	Brazil	Bahia	Barra
<i>T. haemorrhous</i>	AMNH241663	M	Brazil	Piaui	Corrente
<i>T. haemorrhous</i>	AMNH241666	M	Brazil	Bahia	Santa Rita
<i>T. haemorrhous</i>	AMNH404	M	Brazil	Piaui	NA
<i>T. haemorrhous</i>	AMNH241662	F	Brazil	Bahia	Barra
<i>T. haemorrhous</i>	AMNH241661	F	Brazil	Bahia	Barra
<i>T. haemorrhous</i>	AMNH241664	F	Brazil	Piaui	Corrente
<i>T. haemorrhous</i>	USNM264607	M	Brazil	Bahia	Juazeiro
<i>T. haemorrhous</i>	FMNH46975	M	Brazil	Bahia	Queimadas. Rio do Peixe
<i>T. haemorrhous</i>	SMF25817	M	Venezuela	Bolivar	Quiribana de Caicara
<i>T. haemorrhous</i>	FMNH298007	F	Colombia	Meta	Carimagua

<i>T. haemorrhous</i>	USNM351888	M	Venezuela	NA	El Sombrero
<i>T. haemorrhous</i>	USNM388470	F	Venezuela	Caicara	Carapaico
<i>T. haemorrhous</i>	USNM368662	M	Colombia	NA	Nazareth. Serrania de Macuire
<i>T. haemorrhous</i>	USNM368659	M	Colombia	NA	Nazareth. Serrania de Macuire
<i>T. haemorrhous</i>	USNM368658	M	Colombia	La Guajira	Carraipia
<i>T. haemorrhous</i>	USNM368660	F	Colombia	NA	Nazareth. Serrania de Macuire
<i>T. haemorrhous</i>	USNM368661	M	Colombia	NA	Nazareth. Serrania de Macuire
<i>T. haemorrhous</i>	USNM368657	F	Colombia	Carraipia	Guajira
<i>T. haemorrhous</i>	AMNH474335	M	Venezuela	Bolivar	Ciudad Bolivar
<i>T. haemorrhous</i>	AMNH474332	M	Venezuela	NA	Quiribana de Caicara
<i>T. haemorrhous</i>	AMNH474333	M	Venezuela	NA	Quiribana de Caicara
<i>T. haemorrhous</i>	AMNH177095	M	Venezuela	Cedeno	Caicara. Orinoco River
<i>T. haemorrhous</i>	AMNH177096	F	Venezuela	Cedeno	Caicara. Orinoco River
<i>T. haemorrhous</i>	AMNH177092	M	Venezuela	Bolivar	Ciudad Bolivar
<i>T. haemorrhous</i>	AMNH474331	M	Venezuela	NA	Quiribana de Caicara
<i>T. haemorrhous</i>	AMNH177091	M	Venezuela	Bolivar	Ciudad Bolivar
<i>P. leucophthalmus</i>	BMNH1889.1.30.81	NA	Ecuador	NA	Sarayacu
<i>P. leucophthalmus</i>	AMNH281411	M	Brazil	Amazonas	Rosarinho. Lago Vampaio. R.Madeira
<i>P. leucophthalmus</i>	AMNH283272	M	Brazil	NA	Faro. Rio Paratucatu'. Rio Amazon. N bank
<i>P. leucophthalmus</i>	AMNH239764	NA	Peru	NA	Boca Rio Urubamba
<i>P. leucophthalmus</i>	AMNH239757	NA	Peru	NA	Boca Rio Urubamba
<i>P. leucophthalmus</i>	AMNH181193	M	Peru	Cajamarca	Chaupe. 6100 ft
<i>P. leucophthalmus</i>	AMNH406875	NA	Peru	NA	Boca Rio Urubamba
<i>P. leucophthalmus</i>	AMNH474397	M	Bolivia	NA	Province of Sara
<i>P. leucophthalmus</i>	AMNH283271	M	Brazil	NA	Faro. Rio Paratucatu'. Rio Amazon. N bank
<i>P. leucophthalmus</i>	AMNH185210	M	NA	NA	San José Alajo
<i>P. leucophthalmus</i>	AMNH283279	F	Brazil	NA	Faro. Rio Paratucatu'. Rio Amazon. N bank
<i>P. leucophthalmus</i>	USNM273074	M	Peru	NA	Rio Cosireni
<i>P. leucophthalmus</i>	USNM334152	F	captivity	NA	NA
<i>P. leucophthalmus</i>	USNM16651	NA	NA	NA	NA
<i>P. leucophthalmus</i>	USNM445967	F	Colombia	Caquetá	Venecia
<i>P. leucophthalmus</i>	FMNH248525	M	Colombia	Meta	San Juan de Arama
<i>P. leucophthalmus</i>	FMNH249392	M	Colombia	Meta	San Juan de Arama
<i>P. leucophthalmus</i>	FMNH249391	M	Colombia	Meta	San Juan de Arama
<i>P. leucophthalmus</i>	FMNH248523	M	Colombia	Meta	San Juan de Arama
<i>P. leucophthalmus</i>	FMNH249393	F	Colombia	Meta	La Macarena. Rio Guapuya
<i>P. leucophthalmus</i>	FMNH248521	M	Colombia	Meta	La Macarena. Rio Guapuya
<i>P. leucophthalmus</i>	FMNH248527	M	Colombia	Meta	San Juan de Arama
<i>P. leucophthalmus</i>	FMNH286591	M	Peru	Loreto	Liberal. Canal de Puinahua. Rio Ucayali
<i>P. leucophthalmus</i>	BMNH1890.6.1.38	NA	Brazil	SE	NA

<i>P. leucophthalmus</i>	AMNH313930	F	Brazil	Santa Catarina	Ilha Redonda
<i>P. leucophthalmus</i>	AMNH769468	NA	Argentina	Misiones	Arroyo Uruguay. km 30
<i>P. leucophthalmus</i>	AMNH318250	F	Brazil	Parana'	Tibagy. Faz. Monte Alegre
<i>P. leucophthalmus</i>	AMNH313929	M	Brazil	Santa Catarina	Ouro Verde. Serra do Lucindo. 2550 feet
<i>P. leucophthalmus</i>	AMNH313928	F	Brazil	Santa Catarina	Ouro Verde. Serra do Lucindo. 2550 feet
<i>P. leucophthalmus</i>	AMNH313927	NA	Brazil	Santa Catarina	Ouro Verde. Serra do Lucindo. 2550 feet
<i>P. leucophthalmus</i>	AMNH313926	NA	Brazil	Santa Catarina	Ouro Verde. Serra do Lucindo. 2550 feet
<i>P. leucophthalmus</i>	AMNH313925	F	Brazil	Santa Catarina	Ouro Verde. Serra do Lucindo. 2550 feet
<i>P. leucophthalmus</i>	AMNH313933	F	Brazil	Rio Grande do Sul	Santa Cruz. 300 feet
<i>P. leucophthalmus</i>	AMNH313932	NA	Brazil	Rio Grande do Sul	Santa Cruz. 300 feet
<i>P. leucophthalmus</i>	USNM388471	F	Venezuela	Anzoategui	Cantaura
<i>P. leucophthalmus</i>	USNM121056	M	NA	NA	NA
<i>P. leucophthalmus</i>	USNM16558	NA	NA	NA	NA
<i>P. leucophthalmus</i>	USNM24103	NA	Brazil	Santa Catarina	NA
<i>P. leucophthalmus</i>	USNM177632	F	Brazil	NA	Ribeirão do Brugue
<i>P. leucophthalmus</i>	USNM515473	M	Brazil	Amapá	Serra do Navio
<i>P. leucophthalmus</i>	USNM406466	F	Venezuela	Anzoategui	Cantaura
<i>P. leucophthalmus</i>	USNM20945	NA	Brazil	Parana'	NA
<i>P. leucophthalmus</i>	USNM51091	NA	Brazil	NA	NA
<i>P. leucophthalmus</i>	USNM390722	F	NA	NA	NA
<i>P. leucophthalmus</i>	FMNH152011	F	Paraguay	Italia	Villeta
<i>P. leucophthalmus</i>	FMNH152010	M	Paraguay	Italia	Villeta
<i>P. leucophthalmus</i>	FMNH295973	M	Bolivia	Santa Cruz	Santiago Chiq.
<i>P. leucophthalmus</i>	FMNH179096	M	Bolivia	Santa Cruz	Rio Surutu'
<i>P. leucophthalmus</i>	FMNH179095	F	Bolivia	Santa Cruz	Buenavista
<i>P. leucophthalmus</i>	FMNH295974	F	Bolivia	Santa Cruz	Santiago Chiq.
<i>P. leucophthalmus</i>	FMNH334958	M	Bolivia	Santa Cruz	Nuflo de Chavez. Estancia Las Madres. 8 rd km N Concepcion
<i>P. leucophthalmus</i>	FMNH293585	F	Bolivia	Hernando Silez	Chuquisaca. 16 km N Monteagudo
<i>P. leucophthalmus</i>	MNHN1992	NA	Argentina	NA	Trois Sants
<i>P. leucophthalmus</i>	MNHN246	M	Argentina	NA	Ocampo. Santa Fe
<i>P. leucophthalmus</i>	MZUSP16491	F	Brazil	Amazonas	Manacapuru. Rio Solimões
<i>P. leucophthalmus</i>	MZUSP20505	F	Brazil	Amazonas	R. Amazonas (Norte). Lago Serpa
<i>P. leucophthalmus</i>	MZUSP20830	F	Brazil	Amazonas	R. Amazonas (Norte). Itacoatiara
<i>P. leucophthalmus</i>	MZUSP20931	F	Brazil	Amazonas	R. Amazonas (Norte). Itacoatiara
<i>P. leucophthalmus</i>	MZUSP20936	F	Brazil	Amazonas	R. Amazonas (Norte). Itacoatiara
<i>P. leucophthalmus</i>	MZUSP21004	M	Brazil	Amazonas	R. Amazonas (Norte). Itacoatiara

<i>P. leucophthalmus</i>	MZUSP21297	M	Brazil	Amazonas	R. Amazonas (Sul). Lago do Baptista
<i>P. leucophthalmus</i>	MZUSP21298	F	Brazil	Amazonas	R. Amazonas (Sul). Lago do Baptista
<i>P. leucophthalmus</i>	MZUSP21754	NA	Brazil	Amazonas	R. Amazonas (Norte). Lago Serpa
<i>P. leucophthalmus</i>	MZUSP22296	M	Brazil	Amazonas	R. Amazonas (Sul). Lago do Baptista
<i>P. leucophthalmus</i>	MZUSP22297	F	Brazil	Amazonas	R. Amazonas (Norte). Itacoatiara
<i>P. leucophthalmus</i>	MZUSP22298	F	Brazil	Amazonas	R. Amazonas (Norte). Lago Serpa
<i>P. leucophthalmus</i>	MZUSP22300	M	Brazil	Amazonas	R. Amazonas (Norte). Lago do Canaçari
<i>P. leucophthalmus</i>	MZUSP22301	F	Brazil	Amazonas	R. Amazonas (Norte). Itacoatiara
<i>P. leucophthalmus</i>	MZUSP22303	F	Brazil	Amazonas	R. Amazonas (Sul). Lago do Baptista
<i>P. leucophthalmus</i>	MZUSP22305	F	Brazil	Amazonas	R. Amazonas (Norte). Itacoatiara
<i>P. leucophthalmus</i>	MZUSP22307	F	Brazil	Amazonas	R. Amazonas (Sul). Lago do Baptista
<i>P. leucophthalmus</i>	MZUSP22308	M	Brazil	Amazonas	R. Amazonas (Sul). Lago do Baptista
<i>P. leucophthalmus</i>	MZUSP22487	M	Brazil	Amazonas	R. Amazonas (Sul). Lago do Baptista
<i>P. leucophthalmus</i>	MZUSP22488	M	Brazil	Amazonas	R. Amazonas (Norte). Itacoatiara
<i>P. leucophthalmus</i>	MZUSP23566	M	Brazil	Amazonas	R. Juruá. João Pessoa
<i>P. leucophthalmus</i>	MZUSP23568	F	Brazil	Amazonas	R. Amazonas (Norte). Lago do Canaçari
<i>P. leucophthalmus</i>	MZUSP64050	F	Brazil	Amazonas	Itapiranga
<i>P. leucophthalmus</i>	MZUSP67621	F	Brazil	Amazonas	R. Tapará. Santa Maria do Arapemã
<i>P. leucophthalmus</i>	MZUSP67622	NA	Brazil	Amazonas	R. Tapará. Santa Maria do Arapemã
<i>P. leucophthalmus</i>	MZUSP67623	M	Brazil	Amazonas	R. Tapará. Santa Maria do Arapemã
<i>P. leucophthalmus</i>	MZUSP67624	M	Brazil	Amazonas	R. Tapará. Santa Maria do Arapemã
<i>P. leucophthalmus</i>	MZUSP68754	M	Brazil	Amazonas	Itapiranga
<i>P. leucophthalmus</i>	MZUSP68755	F	Brazil	Amazonas	Itapiranga
<i>P. leucophthalmus</i>	MZUSP10653	M	Brazil	Pará	Santarém
<i>P. leucophthalmus</i>	MZUSP20504	F	Brazil	Pará	R. Tapajós (Leste). Piquiatuba
<i>P. leucophthalmus</i>	MZUSP20506	M	Brazil	Pará	R. Tapajós (Leste). Piquiatuba
<i>P. leucophthalmus</i>	MZUSP20515	M	Brazil	Pará	R. Tapajós (Leste). Caxiricatuba
<i>P. leucophthalmus</i>	MZUSP20528	M	Brazil	Pará	R. Tapajós (Leste). Caxiricatuba
<i>P. leucophthalmus</i>	MZUSP20573	NA	Brazil	Pará	R. Tapajós (Leste). Caxiricatuba
<i>P. leucophthalmus</i>	MZUSP20574	NA	Brazil	Pará	R. Tapajós (Leste). Caxiricatuba

<i>P. leucophthalmus</i>	MZUSP20578	M	Brazil	Pará	R. Amazonas (Norte). Igarape Buiucu
<i>P. leucophthalmus</i>	MZUSP20579	M	Brazil	Pará	R. Tapajós (Leste). Caxiricatuba
<i>P. leucophthalmus</i>	MZUSP20580	F	Brazil	Pará	R. Tapajós (Leste). Piquiatuba
<i>P. leucophthalmus</i>	MZUSP20935	F	Brazil	Pará	R. Tapajós (Leste). Caxiricatuba
<i>P. leucophthalmus</i>	MZUSP21005	F	Brazil	Pará	R. Tapajós (Leste). Piquiatuba
<i>P. leucophthalmus</i>	MZUSP21458	M	Brazil	Pará	R. Tapajós (Leste). Caxiricatuba
<i>P. leucophthalmus</i>	MZUSP22299	M	Brazil	Pará	R. Amazonas (Sul). Foz do Rio Curua
<i>P. leucophthalmus</i>	MZUSP22302	M	Brazil	Pará	R. Amazonas (Norte). Igarape Buiucu
<i>P. leucophthalmus</i>	MZUSP22304	M	Brazil	Pará	R. Tapajós (Leste). Piquiatuba
<i>P. leucophthalmus</i>	MZUSP22306	M	Brazil	Pará	R. Amazonas (Sul). Foz do Rio Curua
<i>P. leucophthalmus</i>	MZUSP22317	M	Brazil	Pará	R. Tapajós (Leste). Piquiatuba
<i>P. leucophthalmus</i>	MZUSP22445	M	Brazil	Pará	R. Tapajós (Leste). Caxiricatuba
<i>P. leucophthalmus</i>	MZUSP22575	M	Brazil	Pará	R. Tapajós (Leste). Piquiatuba
<i>P. leucophthalmus</i>	MZUSP22576	M	Brazil	Pará	R. Amazonas (Sul). Foz do Rio Curua
<i>P. leucophthalmus</i>	MZUSP23565	M	Brazil	Pará	R. Tapajós (Leste). Piquiatuba
<i>P. leucophthalmus</i>	MZUSP23567	M	Brazil	Pará	R. Amazonas (Norte). Igarape Buiucu
<i>P. leucophthalmus</i>	MZUSP46397	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>P. leucophthalmus</i>	MZUSP46398	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>P. leucophthalmus</i>	MZUSP46399	M	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>P. leucophthalmus</i>	MZUSP46400	M	Brazil	Pará	R. Tapajós (Leste). Tavio
<i>P. leucophthalmus</i>	MZUSP46401	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia. Távio
<i>P. leucophthalmus</i>	MZUSP46402	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia. Távio
<i>P. leucophthalmus</i>	MZUSP46403	M	Brazil	Pará	R. Tapajós (Leste). Fordlândia. Távio
<i>P. leucophthalmus</i>	MZUSP46404	M	Brazil	Pará	Fordlândia. Rio Tapajós
<i>P. leucophthalmus</i>	MZUSP46405	F	Brazil	Pará	Fordlândia. Rio Tapajós
<i>P. leucophthalmus</i>	MZUSP46406	F	Brazil	Pará	Fordlândia. Rio Tapajós
<i>P. leucophthalmus</i>	MZUSP46407	M	Brazil	Pará	Fordlândia. Rio Tapajós
<i>P. leucophthalmus</i>	MZUSP58228	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>P. leucophthalmus</i>	MZUSP58229	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>P. leucophthalmus</i>	MZUSP58230	M	Brazil	Pará	R. Tapajós (Leste). Tauari
<i>P. leucophthalmus</i>	MZUSP58231	M	Brazil	Pará	R. Tapajós (Leste). Tauari
<i>P. leucophthalmus</i>	MZUSP58232	F	Brazil	Pará	R. Tapajós (Leste). Tauari
<i>P. leucophthalmus</i>	MZUSP58357	M	Brazil	Pará	R. Tapajós (Leste). Tauari
<i>P. leucophthalmus</i>	MZUSP58358	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia

<i>P. leucophthalmus</i>	MZUSP58359	M	Brazil	Pará	R. Tapajós (Leste). Tauari
<i>P. leucophthalmus</i>	MZUSP58360	M	Brazil	Pará	R. Tapajós (Leste). Tauari
<i>P. leucophthalmus</i>	MZUSP58361	M	Brazil	Pará	R. Tapajós (Leste). Tauari
<i>P. leucophthalmus</i>	MZUSP58362	M	Brazil	Pará	R. Tapajós (Leste). Tauari
<i>P. leucophthalmus</i>	MZUSP58363	F	Brazil	Pará	R. Tapajós (Leste). Tauari
<i>P. leucophthalmus</i>	MZUSP58364	F	Brazil	Pará	R. Tapajós (Leste). Tauari
<i>P. leucophthalmus</i>	MZUSP58365	M	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>P. leucophthalmus</i>	MZUSP58366	NA	Brazil	Pará	R. Tapajós (Oeste). Urucurituba
<i>P. leucophthalmus</i>	MZUSP58375	F	Brazil	Pará	R. Tapajós (Leste). Tauari
<i>P. leucophthalmus</i>	MZUSP60479	M	Brazil	Pará	Uraçagui (Rio Tapajós. oeste)
<i>P. leucophthalmus</i>	MZUSP60480	M	Brazil	Pará	R. Tapajós (Oeste). Uraçagui
<i>P. leucophthalmus</i>	MZUSP60481	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>P. leucophthalmus</i>	MZUSP60482	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>P. leucophthalmus</i>	MZUSP60494	F	Brazil	Pará	Uraçagui (Rio Tapajós. oeste)
<i>P. leucophthalmus</i>	MZUSP60495	M	Brazil	Pará	Uraçagui (Rio Tapajós. oeste)
<i>P. leucophthalmus</i>	MZUSP60496	F	Brazil	Pará	Uraçagui (Rio Tapajós. oeste)
<i>P. leucophthalmus</i>	MZUSP60497	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>P. leucophthalmus</i>	MZUSP60498	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>P. leucophthalmus</i>	MZUSP60499	M	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>P. leucophthalmus</i>	MZUSP63028	M	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>P. leucophthalmus</i>	MZUSP63029	F	Brazil	Pará	R. Tapajós (Oeste). Urucurituba
<i>P. leucophthalmus</i>	MZUSP63030	F	Brazil	Pará	R. Tapajós (Oeste). Urucurituba
<i>P. leucophthalmus</i>	MZUSP63031	M	Brazil	Pará	R. Tapajós (Oeste). Urucurituba
<i>P. leucophthalmus</i>	MZUSP63959	M	Brazil	Pará	R. Trombetas. Oriximiná
<i>P. leucophthalmus</i>	MZUSP63960	F	Brazil	Pará	R. Trombetas. Oriximiná
<i>P. leucophthalmus</i>	MZUSP64308	F	Brazil	Pará	Baixo Xingu (margem direita)
<i>P. leucophthalmus</i>	MZUSP66528	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>P. leucophthalmus</i>	MZUSP66529	M	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>P. leucophthalmus</i>	MZUSP66530	NA	Brazil	Pará	R. Tapajós (Oeste). Urucurituba
<i>P. leucophthalmus</i>	MZUSP68875	F	Brazil	Pará	R. Tapajós (Oeste). Urucurituba
<i>P. leucophthalmus</i>	MZUSP68876	F	Brazil	Pará	R. Tapajós (Oeste). Urucurituba
<i>P. leucophthalmus</i>	MZUSP68877	M	Brazil	Pará	R. Tapajós (Oeste). Urucurituba
<i>P. leucophthalmus</i>	MZUSP68878	M	Brazil	Pará	R. Tapajós (Oeste). Urucurituba
<i>P. leucophthalmus</i>	MZUSP68879	M	Brazil	Pará	R. Tapajós (Oeste). Urucurituba
<i>P. leucophthalmus</i>	MZUSP68880	M	Brazil	Pará	R. Tapajós (Oeste). Urucurituba
<i>P. leucophthalmus</i>	MZUSP68881	F	Brazil	Pará	R. Tapajós (Oeste). Urucurituba
<i>P. leucophthalmus</i>	MZUSP68882	M	Brazil	Pará	R. Tapajós (Leste). Fordlândia

<i>P. leucophthalmus</i>	MZUSP68883	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>P. leucophthalmus</i>	MZUSP68884	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>P. leucophthalmus</i>	MZUSP68885	M	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>P. leucophthalmus</i>	MZUSP68886	M	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>P. leucophthalmus</i>	MZUSP68887	M	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>P. leucophthalmus</i>	MZUSP68888	NA	Brazil	Pará	R. Tapajós
<i>P. leucophthalmus</i>	MZUSP71283	M	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>P. leucophthalmus</i>	MZUSP71284	NA	Brazil	Pará	NA
<i>P. leucophthalmus</i>	MZUSP71379	M	Brazil	Pará	R. Tapajós (Oeste). Sumaúma
<i>P. leucophthalmus</i>	MZUSP72098	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia
<i>P. leucophthalmus</i>	MZUSP72099	M	Brazil	Pará	R. Tapajós (Oeste). Sumaúma
<i>P. leucophthalmus</i>	MZUSP73204	F	Brazil	Pará	R. Tapajós (Leste). Fordlândia. Távio
<i>P. leucophthalmus</i>	MZUSP73205	M	Brazil	Pará	Fordlândia
<i>P. leucophthalmus</i>	MZUSP83754	F	Brazil	Pará	Faz. Fartura. Santana do Araguaia
<i>P. leucophthalmus</i>	MZUSP83755	M	Brazil	Pará	Faz. Fartura. Santana do Araguaia
<i>P. leucophthalmus</i>	MZUSP83756	NA	Brazil	Pará	Faz. Fartura. Santana do Araguaia
<i>P. leucophthalmus</i>	MZUSP52306	M	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52307	M	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52308	F	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52309	F	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52310	F	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52311	F	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52312	M	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52313	M	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52314	F	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52315	F	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52316	F	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52317	F	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52318	F	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52319	M	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52320	M	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52321	M	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52322	M	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52323	M	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52324	M	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52325	F	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52326	M	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52327	F	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52328	F	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52329	F	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52330	M	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52331	F	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52332	M	Brazil	Tocantins	Araguatins

<i>P. leucophthalmus</i>	MZUSP52333	F	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52334	F	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52335	F	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52336	NA	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52337	M	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52338	F	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52339	F	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52340	M	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52341	M	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52342	F	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52343	M	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52344	M	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52345	M	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52346	F	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52347	F	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP52348	NA	Brazil	Tocantins	Araguatins
<i>P. leucophthalmus</i>	MZUSP14886	M	Brazil	Goiás	Inhumas
<i>P. leucophthalmus</i>	MZUSP14887	M	Brazil	Goiás	Inhumas
<i>P. leucophthalmus</i>	MZUSP14888	F	Brazil	Goiás	Jaraguá. Rio das Almas
<i>P. leucophthalmus</i>	MZUSP14889	M	Brazil	Goiás	Inhumas
<i>P. leucophthalmus</i>	MZUSP14892	F	Brazil	Goiás	Inhumas
<i>P. leucophthalmus</i>	MZUSP51814	F	Brazil	Goiás	Goiânia
<i>P. leucophthalmus</i>	MZUSP52305	NA	Brazil	Goiás	Goiânia
<i>P. leucophthalmus</i>	MZUSP74027	M	Brazil	Goiás	R. Bagagem (margem esquerda). Serra Negra. Niquelândia
<i>P. leucophthalmus</i>	MZUSP17094	F	Brazil	Mato Grosso	Chapada
<i>P. leucophthalmus</i>	MZUSP81756	F	Brazil	Mato Grosso	Linha I. margem esquerda rio Teles Pires. Paranaíta
<i>P. leucophthalmus</i>	MZUSP20334	M	Brazil	Mato Grosso do Sul	Barra do Paredão. Rio Paraná Sul
<i>P. leucophthalmus</i>	MZUSP26724	F	Brazil	Mato Grosso do Sul	Salobra
<i>P. leucophthalmus</i>	MZUSP30143	F	Brazil	Mato Grosso do Sul	Corumbá
<i>P. leucophthalmus</i>	MZUSP73685	M	Brazil	Mato Grosso do Sul	Faz. Barma. Santa Rita do Pardo
<i>P. leucophthalmus</i>	MZUSP73686	F	Brazil	Mato Grosso do Sul	Faz. Barma. Santa Rita do Pardo
<i>P. leucophthalmus</i>	MZUSP7797	M	Brazil	Minas Gerais	Teófilo Otoni
<i>P. leucophthalmus</i>	MZUSP10357	F	Brazil	Minas Gerais	Araguari. rio Matipo
<i>P. leucophthalmus</i>	MZUSP10358	F	Brazil	Minas Gerais	Araguari. Q. Sacramento
<i>P. leucophthalmus</i>	MZUSP82873	F	Brazil	Minas Gerais	Coração de Jesus
<i>P. leucophthalmus</i>	MZUSP82849	NA	Brazil	Minas Gerais	Coração de Jesus
<i>P. leucophthalmus</i>	MZUSP88329	NA	Brazil	Minas Gerais	Fazenda Jacaré. Oliveira
<i>P. leucophthalmus</i>	MZUSP88330	F	Brazil	Minas Gerais	Fazenda Jacaré. Oliveira
<i>P. leucophthalmus</i>	MZUSP88345	NA	Brazil	Minas Gerais	Fazenda Ribeira das

					cachoeiras
<i>P. leucophthalmus</i>	MZUSP1823	F	Brazil	Paraná	Jacarezinho
<i>P. leucophthalmus</i>	MZUSP36741	M	Brazil	Paraná	R. Paracaí
<i>P. leucophthalmus</i>	MZUSP36742	M	Brazil	Paraná	R. Paracaí
<i>P. leucophthalmus</i>	MZUSP36743	M	Brazil	Paraná	R. Paracaí
<i>P. leucophthalmus</i>	MZUSP36744	M	Brazil	Paraná	R. Paracaí
<i>P. leucophthalmus</i>	MZUSP36745	M	Brazil	Paraná	R. Paracaí
<i>P. leucophthalmus</i>	MZUSP3164	NA	Brazil	São Paulo	Franca
<i>P. leucophthalmus</i>	MZUSP4488	M	Brazil	São Paulo	Avanhandava
<i>P. leucophthalmus</i>	MZUSP7984	M	Brazil	São Paulo	Franca
<i>P. leucophthalmus</i>	MZUSP8141	F	Brazil	São Paulo	Ituverava
<i>P. leucophthalmus</i>	MZUSP9852	M	Brazil	São Paulo	Vila Olímpia
<i>P. leucophthalmus</i>	MZUSP9853	F	Brazil	São Paulo	Vila Olímpia
<i>P. leucophthalmus</i>	MZUSP26721	M	Brazil	São Paulo	Faz. Varjão. Lins
<i>P. leucophthalmus</i>	MZUSP26722	F	Brazil	São Paulo	Faz. Varjão. Lins
<i>P. leucophthalmus</i>	MZUSP26723	F	Brazil	São Paulo	Faz. Varjão. Lins
<i>P. leucophthalmus</i>	MZUSP31468	F	Brazil	São Paulo	Faz. Três Barras. Pitangueiras
<i>P. leucophthalmus</i>	MZUSP74670	NA	Brazil	São Paulo	Castilho. marg esq rio Paraná
<i>P. leucophthalmus</i>	MZUSP2453	NA	Brazil	Rio Grande do Sul	NA
<i>P. leucophthalmus</i>	MZUSP9098	M	Brazil	Rio Grande do Sul	R. Uruguai
<i>P. leucophthalmus</i>	MZUSP9099	F	Brazil	Rio Grande do Sul	R. Uruguai
<i>P. leucophthalmus</i>	MZUSP72858	NA	Brazil	NA	NA
<i>P. leucophthalmus</i>	MZUSP72930	NA	Brazil	NA	NA
<i>P. leucophthalmus</i>	MZUSP73114	F	Brazil	NA	Amazônia
<i>P. leucophthalmus</i>	MZUSP73121	M	Brazil	NA	Amazônia
<i>P. leucophthalmus</i>	MZUSP73159	F	Brazil	NA	Amazônia
<i>P. leucophthalmus</i>	MZUSP68198	M	Peru	NA	Pucallpa
<i>P. leucophthalmus</i>	LSUMZ782	M	Venezuela	Aragua	San Juan de los morros
<i>P. leucophthalmus</i>	LSUMZ52913	NA	Ecuador	Napo	Rio Aguarico. Santa Cecilia. ca 400 m
<i>P. leucophthalmus</i>	LSUMZ52912	F	Ecuador	Napo	Rio Aguarico. Santa Cecilia. ca 400 m
<i>P. leucophthalmus</i>	LSUMZ87252	F	Peru	Amazonas	12 trail km E La Peca. ca 5700 ft
<i>P. leucophthalmus</i>	LSUMZ87254	F	Peru	Amazonas	vicinity of Huampami on Rio Conepa. ca 700
<i>P. leucophthalmus</i>	LSUMZ91666	M	Peru	Amazonas	Caterpiza on quebrada da Caterpiza. E banktrib. Of Rio Santiago. 200 m
<i>P. leucophthalmus</i>	LSUMZ123507	F	Bolivia	Beni	General Bolivian. 16 km by road SW San Borja. 450 m
<i>P. leucophthalmus</i>	LSUMZ123508	M	Bolivia	Beni	Moxos. 38 km by road W Trinidad. 175 m
<i>P. leucophthalmus</i>	LSUMZ37254	M	Bolivia	Beni	Marban. Rio Mamoré. 240 m
<i>P. leucophthalmus</i>	LSUMZ123509	F	Bolivia	Santa Cruz	Cordillera. 10 km by road E Gutierrez. Laguna Caucaya. 874 m

<i>P. euops</i>	AMNH54308	F	Cuba	NA	Trinidad
<i>P. euops</i>	AMNH86886	M	Cuba	NA	San Juan de los Remedios
<i>P. euops</i>	AMNH54304	M	Cuba	NA	Trinidad
<i>P. euops</i>	AMNH54310	M	Cuba	NA	Trinidad
<i>P. euops</i>	AMNH399400bis	F	Cuba	NA	Bayate
<i>P. euops</i>	AMNH399399	F	Cuba	NA	Bayate
<i>P. euops</i>	AMNH791581	F	Cuba	NA	Guama
<i>P. euops</i>	AMNH54312	F	Cuba	NA	Trinidad
<i>P. euops</i>	AMNH474422	F	NA	NA	NA
<i>P. euops</i>	AMNH474421	M	NA	NA	London
<i>P. euops</i>	USNM453658	F	Cuba	Guantanamo	Yateras
<i>P. euops</i>	USNM372216	NA	captivity	NA	NA
<i>P. euops</i>	USNM543661	F	Cuba	Guantanamo	Yateras
<i>P. euops</i>	USNM453679	F	Cuba	Guantanamo	Yateras
<i>P. euops</i>	USNM453677	F	Cuba	Guantanamo	Yateras
<i>P. euops</i>	USNM453668	F	Cuba	Guantanamo	Yateras
<i>P. euops</i>	USNM177452	M	Cuba	NA	Guamá
<i>P. euops</i>	USNM177490	M	Cuba	NA	Guamá
<i>P. euops</i>	USNM453676	M	Cuba	Guantanamo	Yateras
<i>P. euops</i>	USNM103970	F	Cuba	NA	Remedios
<i>P. euops</i>	LSUMZ52851	M	Cuba	Oriente	Taco Bay
<i>P. euops</i>	LSUMZ142057	M	Cuba	Camaguey	20 km W of Camaguey
<i>P. euops</i>	LSUMZ142058	NA	Cuba	Camaguey	20 km W of Camaguey
<i>P. euops</i>	LSUMZ142059	M	Cuba	Camaguey	20 km W of Camaguey
<i>P. euops</i>	FMNH371832	M	Cuba	Baracoa	El Jucaro. Veguitas del Sur
<i>P. euops</i>	FMNH371833	M	Cuba	Baracoa	La Tinta. orilla del rio Cañas. Jauco
<i>P. euops</i>	FMNH40315	NA	Cuba	NA	NA
<i>P. euops</i>	FMNH40318	M	Cuba	Oriente	Yaleras
<i>P. euops</i>	FMNH40317	F	Cuba	Oriente	Yaleras
<i>P. euops</i>	FMNH40316	M	Cuba	Oriente	Yaleras
<i>P. euops</i>	FMNH371829	M	Cuba	Oriente	Jobabo
<i>P. euops</i>	FMNH371831	M	Cuba	Baracoa	El Jucaro. Veguitas del Sur
<i>P. euops</i>	FMNH371830	F	Cuba	Baracoa	El Jucaro. Veguitas del Sur
<i>P. euops</i>	BMNH1914.18.1.407	NA	Cuba	NA	Mayari River. Nipe Bay
<i>P. euops</i>	BMNH1914.12.1.406	NA	Cuba	NA	Mayari River. Nipe Bay
<i>P. euops</i>	MNHN141	M	Cuba	NA	Bayate
<i>P. finschi</i>	BMNH1889.1.30.68	M	Panama	Veragua	W of David. S slope of volcano of Chiriqui. Bugaba
<i>P. finschi</i>	AMNH389258	M	Costa Rica	NA	Limon
<i>P. finschi</i>	AMNH186673	F	Panama	NA	a Marea. 20 miles S of Santiago. Veraguas
<i>P. finschi</i>	AMNH474360	F	Panama	Chiriqui	Brava I.
<i>P. finschi</i>	AMNH474359	M	Panama	Chiriqui	Brava I.
<i>P. finschi</i>	AMNH389263	M	Costa Rica	NA	Val.Turrialba. 500 ft. Ital. La Iberia
<i>P. finschi</i>	AMNH389259	M	Costa Rica	NA	Limon

<i>P. finschi</i>	AMNH186678	F	Panama	NA	El Villano. 15 miles SE of Santiago. Veraguas
<i>P. finschi</i>	AMNH186680	M	Panama	NA	El Villano. 15 miles SE of Santiago. Veraguas
<i>P. finschi</i>	AMNH474361	M	Panama	NA	Cebaco I. Veragua
<i>P. finschi</i>	AMNH474357	M	Panama	NA	Ladrones I.
<i>P. finschi</i>	USNM199169	F	Costa Rica	NA	Bonillo
<i>P. finschi</i>	USNM209810	F	Costa Rica	NA	Bonillo
<i>P. finschi</i>	USNM127043	F	Nicaragua	NA	Rio Escondido
<i>P. finschi</i>	USNM199162	F	Costa Rica	NA	Bonillo
<i>P. finschi</i>	USNM532993	F	Panama	Chiriqui	Puerto Armuelles
<i>P. finschi</i>	USNM209821	F	Costa Rica	NA	Guayabo
<i>P. finschi</i>	USNM209822	F	Costa Rica	NA	Guayabo
<i>P. finschi</i>	USNM209824	F	Costa Rica	NA	Guayabo
<i>P. finschi</i>	USNM209813	F	Costa Rica	NA	Bonillo
<i>P. finschi</i>	USNM209823	F	Costa Rica	NA	Guayabo
<i>P. finschi</i>	LSUMZ32439	M	Costa Rica	Limon	1 mi S Linda Vista. 480 m
<i>P. finschi</i>	LSUMZ35369	F	Costa Rica	Limon	Guacimo. Rio Guacimo
<i>P. finschi</i>	LSUMZ35370	M	Costa Rica	Heredia	ca 2 mi SE Puerto Viejo
<i>P. finschi</i>	LSUMZ98211	M	Costa Rica	Alajuela	ca 1 mi NE Los Chiles
<i>P. finschi</i>	LSUMZ174813	M	Panama	Chiriqui	Bartolo Arriba. Burica Peninsula
<i>P. finschi</i>	FMNH206802	F	Panama	Boquete	Lerida. 5300 ft
<i>P. finschi</i>	FMNH206801	M	Panama	Boquete	Lerida. 5300 ft
<i>P. finschi</i>	FMNH206803	M	Panama	Boquete	Quiel. 5000 ft
<i>P. finschi</i>	FMNH206804	F	Panama	Boquete	Quiel. 5000 ft
<i>P. finschi</i>	FMNH206800	NA	Panama	Boquete	Lerida. 5300 ft
<i>P. finschi</i>	FMNH72322	M	Costa Rica	Limon	Guapiles
<i>P. finschi</i>	FMNH72320	M	Costa Rica	Limon	Limon
<i>P. finschi</i>	FMNH72321	F	Costa Rica	Limon	Guapiles
<i>P. finschi</i>	FMNH44127	M	Costa Rica	Limon	Limon
<i>P. finschi</i>	FMNH36020	M	Costa Rica	Cartago	Guayabo
<i>P. finschi</i>	MNHN514	NA	Panama	Chiriqui	NA
<i>P. chloropterus</i>	BMNH1859.11.22.56	NA	Dominican Republic	NA	San Domingo
<i>P. chloropterus</i>	AMNH163835	M	Dominican Republic	NA	San Domingo
<i>P. chloropterus</i>	AMNH163829	M	Dominican Republic	NA	San Domingo
<i>P. chloropterus</i>	AMNH474416	M	Dominican Republic	NA	Crucero. San Domingo
<i>P. chloropterus</i>	AMNH474412	M	Dominican Republic	NA	San Domingo. Azua
<i>P. chloropterus</i>	AMNH163828	M	Dominican Republic	NA	San Domingo
<i>P. chloropterus</i>	AMNH163831	M	Dominican Republic	NA	San Domingo
<i>P. chloropterus</i>	AMNH269849	F	Dominican Republic	NA	San Domingo. San Juan
<i>P. chloropterus</i>	AMNH474411	M	Dominican Republic	NA	San Domingo. Azua

			Republic		
<i>P. chloropterus</i>	AMNH163827	M	Dominican Republic	NA	San Domingo
<i>P. chloropterus</i>	AMNH474413	M	Dominican Republic	NA	San Domingo. Azua
<i>P. chloropterus</i>	USNM92047	F	Dominican Republic	NA	Samana
<i>P. chloropterus</i>	USNM354354	M	Dominican Republic	NA	San Juan
<i>P. chloropterus</i>	USNM264742	F	Haiti	NA	Massif de la Selle
<i>P. chloropterus</i>	USNM280158	F	Haiti	NA	San Rafael
<i>P. chloropterus</i>	USNM280161	F	Haiti	NA	Cerea La Source
<i>P. chloropterus</i>	USNM109927	M	Dominican Republic	NA	Samana
<i>P. chloropterus</i>	USNM354356	F	Dominican Republic	NA	San Juan
<i>P. chloropterus</i>	USNM264740	M	Dominican Republic	NA	Costanza
<i>P. chloropterus</i>	USNM354357	F	Dominican Republic	NA	San Juan
<i>P. chloropterus</i>	USNM324871	M	NA	NA	NA
<i>P. chloropterus</i>	LSUMZ142050	M	Dominican Republic	El Seibo	16 mi E Miches
<i>P. chloropterus</i>	LSUMZ142051	F	Dominican Republic	El Seibo	16 mi E Miches
<i>P. chloropterus</i>	LSUMZ142052	M	Dominican Republic	El Seibo	16 mi E Miches
<i>P. chloropterus</i>	LSUMZ142053	F	Dominican Republic	San Juan	4 km E El Cercado
<i>P. chloropterus</i>	LSUMZ142054	M	Dominican Republic	Monte Cristi	Laguna, 7 km SE Pepillo Salcedo
<i>P. chloropterus</i>	LSUMZ142056	M	Haiti	L'Ouest	1.1 mi S Poste Rouge
<i>P. chloropterus</i>	FMNH40302	M	Dominican Republic	Samana	Samana
<i>P. chloropterus</i>	FMNH40285	M	Dominican Republic	Samana	Samana
<i>P. chloropterus</i>	FMNH40305	M	Dominican Republic	Samana	Samana
<i>P. chloropterus</i>	FMNH40297	M	Dominican Republic	Samana	Samana
<i>P. chloropterus</i>	FMNH40288	F	Dominican Republic	Samana	Samana
<i>P. chloropterus</i>	FMNH1833	F	Dominican Republic	Santo Domingo	Catare
<i>P. chloropterus</i>	FMNH40312	F	Dominican Republic	Seibo	Magua
<i>P. chloropterus</i>	FMNH40313	F	Dominican Republic	Seibo	Magua
<i>P. chloropterus</i>	FMNH40293	F	Dominican Republic	Samana	Samana
<i>P. chloropterus</i>	FMNH355157	F	Dominican Republic	Cabo Rojo	NA
<i>P. chloropterus</i>	MNHN475	M	Dominican Republic	NA	San Domingo

<i>P. chloropterus</i>	MNHN477	M	Dominican Republic	NA	San Domingo
<i>P. chloropterus</i>	MNHN476	M	Dominican Republic	NA	San Domingo
<i>P. maugeri</i>	MNHN132	NA	Antilles	NA	NA
<i>P. maugeri</i>	LSUMZ39657	M	Puerto Rico	NA	Mona Island
<i>P. maugeri</i>	LSUMZ43732	F	Puerto Rico	NA	Mona Island
<i>P. maugeri</i>	LSUMZ61276	F	Puerto Rico	NA	Mona Island
<i>P. maugeri</i>	FMNH40314	F	Puerto Rico	NA	Mona Island
<i>P. erythrogegens</i>	BMNH18.59.11.22.5	NA	Ecuador	NA	Guaiquil
<i>P. erythrogegens</i>	AMNH44692	F	Ecuador	NA	Guaiquil
<i>P. erythrogegens</i>	AMNH474354	NA	Peru	NA	Tumbes
<i>P. erythrogegens</i>	AMNH474352	NA	Ecuador	NA	Zoological Society's Gradens. Regent's Park.London
<i>P. erythrogegens</i>	AMNH166731	F	Ecuador	NA	Punta Santa Ana. Portovelo-Loja trail. Prov. Del Oro
<i>P. erythrogegens</i>	AMNH474353	NA	Peru	NA	Gran N Peron
<i>P. erythrogegens</i>	AMNH170922	F	Ecuador	NA	Bucay. Prov. De Chimborazo
<i>P. erythrogegens</i>	AMNH170920	F	Ecuador	NA	Guainiche. SE of Alamor. Prov. De Loja
<i>P. erythrogegens</i>	AMNH474351	F	Ecuador	NA	Zoological Society's Gradens. Regent's Park. London
<i>P. erythrogegens</i>	AMNH123999	F	Ecuador	NA	Daule. Prov. Of Guayas
<i>P. erythrogegens</i>	AMNH175100	M	Peru	NA	Dpto. Piura. Palamblla. 3900-6500 ft
<i>P. erythrogegens</i>	USNM609361	F	Peru	NA	NA
<i>P. erythrogegens</i>	USNM20948	NA	Brazil	Paraná	NA
<i>P. erythrogegens</i>	LSUMZ75110	F	Peru	Tumbes	Rica Playa. rio Tumbes
<i>P. erythrogegens</i>	LSUMZ75109	F	Peru	Tumbes	Rica Playa. rio Tumbes
<i>P. erythrogegens</i>	LSUMZ182914	M	Peru	Tumbes	7.4 km S El Tutuno
<i>P. erythrogegens</i>	LSUMZ182915	M	Peru	Tumbes	1.2 km NE El Cardo
<i>P. erythrogegens</i>	LSUMZ80368	F	Peru	Piura	ca 3 km by road N Chignia. ca 1000
<i>P. erythrogegens</i>	LSUMZ72172	M	Peru	Piura	ca 90 km NNW Sullana El Angolo. ca 700m
<i>P. erythrogegens</i>	LSUMZ84334	F	Peru	Lambayequei	12 km N Olmos
<i>P. erythrogegens</i>	LSUMZ100614	F	Peru	Lambayequei	Las Pampas. km 885 Pan-american Hwy. 11 km N Olmos. 90 m
<i>P. erythrogegens</i>	FMNH57493	M	Ecuador	Guayas	Puente de Chimbo
<i>P. erythrogegens</i>	FMNH57624	F	Ecuador	Guayas	Milagro
<i>P. erythrogegens</i>	FMNH53671	M	Ecuador	Azuay	San Jose
<i>P. erythrogegens</i>	FMNH56723	M	Ecuador	Guayas	Milagro
<i>P. erythrogegens</i>	FMNH57622	F	Ecuador	Guayas	Milagro
<i>P. erythrogegens</i>	FMNH57428	F	Ecuador	Guayas	Puente de Chimbo
<i>P. erythrogegens</i>	FMNH371825	M	captivity	Miami	NA
<i>P. erythrogegens</i>	MNHN481	NA	NA	NA	Pahatanga
<i>P. erythrogegens</i>	MNHN480	NA	Ecuador	NA	NA
<i>P. erythrogegens</i>	MNHN482	NA	Ecuador	NA	NA
<i>P. brevipes</i>	USNM91098	M	Nicaragua	NA	NA

<i>P. brevipes</i>	AMNH143783	F	Nicaragua	NA	Corinto
<i>P. brevipes</i>	AMNH406625	F	Guatemala	NA	Finca Cipres
<i>P. brevipes</i>	AMNH406624	F	Guatemala	NA	Sacapulas
<i>P. brevipes</i>	AMNH393722	M	Guatemala	NA	San Lucas
<i>P. brevipes</i>	AMNH343721	M	Guatemala	NA	San Lucas
<i>P. brevipes</i>	AMNH406623	F	Guatemala	NA	Sacapulas
<i>P. brevipes</i>	AMNH393718	M	Guatemala	NA	Finca Cipres
<i>P. brevipes</i>	AMNH393720	F	Guatemala	NA	Finca Cipres
<i>P. brevipes</i>	AMNH143785	M	Nicaragua	NA	Corinto
<i>P. brevipes</i>	AMNH393717	NA	Guatemala	NA	Chichicastenango
<i>P. brevipes</i>	USNM257757	M	Guatemala	NA	NA
<i>P. brevipes</i>	USNM191648	NA	Guatemala	NA	NA
<i>P. brevipes</i>	USNM349535	M	Guatemala	NA	Tecpam
<i>P. brevipes</i>	USNM349536	F	Guatemala	NA	Chichivac
<i>P. brevipes</i>	USNM257758	M	Guatemala	NA	NA
<i>P. brevipes</i>	LSUMZ39656	M	Mexico	Oaxaca	La Ventosa
<i>P. brevipes</i>	LSUMZ23691	M	Guatemala	Usumatlan 2 mi N	Sierra de las Minas
<i>P. brevipes</i>	FMNH50108	NA	Guatemala	NA	NA
<i>P. brevipes</i>	FMNH111278	M	El Salvador	San Salvador	Volcan de San Rafael
<i>P. brevipes</i>	FMNH111277	F	El Salvador	San Salvador	Volcan de San Rafael
<i>P. brevipes</i>	FMNH111279	F	El Salvador	NA	Sonsonate
<i>P. brevipes</i>	FMNH212209	M	El Salvador	San Salvador	NA
<i>P. brevipes</i>	FMNH212208	F	El Salvador	San Salvador	NA
<i>P. rubritorquis</i>	FMNH15509	F	Nicaragua	Chinandeza	San Geronimo
<i>P. rubritorquis</i>	FMNH15507	F	Nicaragua	Chinandeza	San Geronimo
<i>P. rubritorquis</i>	FMNH15506	F	Nicaragua	Chinandeza	San Geronimo
<i>P. rubritorquis</i>	FMNH15511	F	Nicaragua	Chinandeza	San Geronimo
<i>P. holochlorus</i>	MCZ24700	M	Mexico	Chihuahua	Hacienda de San Rafael
<i>P. holochlorus</i>	USNM300182	M	Mexico	Chihuahua	Hacienda de San Rafael
<i>P. brevipes</i>	USNM39971	M	Mexico	NA	Socorro Island
<i>P. brevipes</i>	AMNH474433	F	Mexico	NA	Socorro Island
<i>P. brevipes</i>	AMNH474428	M	Mexico	NA	Socorro Island
<i>P. brevipes</i>	AMNH474427	M	Mexico	NA	Socorro Island
<i>P. brevipes</i>	AMNH474429	M	Mexico	NA	Socorro Island
<i>P. brevipes</i>	AMNH474430	M	Mexico	NA	Socorro Island
<i>P. brevipes</i>	AMNH474432	F	Mexico	NA	Socorro Island
<i>P. brevipes</i>	AMNH474431	M	Mexico	NA	Socorro Island
<i>P. brevipes</i>	USNM189123	M	Mexico	NA	Socorro Island
<i>P. brevipes</i>	USNM39972	F	Mexico	NA	Socorro Island
<i>P. brevipes</i>	USNM189121	M	Mexico	NA	Socorro Island
<i>P. brevipes</i>	USNM309059	F	Mexico	NA	Socorro Island
<i>P. brevipes</i>	USNM309060	M	Mexico	NA	Socorro island
<i>P. brevipes</i>	USNM189122	F	Mexico	NA	Socorro Island
<i>P. brevipes</i>	USNM189124	F	Mexico	NA	Socorro Island
<i>P. brevipes</i>	USNM189125	M	Mexico	NA	Socorro Island

<i>P. brevipes</i>	USNM50774	M	Mexico	NA	Socorro Island
<i>P. brevipes</i>	USNM50776	F	Mexico	NA	Socorro Island
<i>P. holochlorus</i>	BMNH1890.6.1.35	NA	Mexico	Vera Cruz	Jalapa
<i>P. holochlorus</i>	FMNH208673	M	Mexico	Tamaulipas	Rio Sabinas near Gomez Farias. Pano Ayuctle 30 mi N El Mante
<i>P. holochlorus</i>	FMNH102801	F	Mexico	Tamaulipas	Rio Sabinas near Gomez Farias
<i>P. holochlorus</i>	FMNH102802	M	Mexico	Tamaulipas	Rio Sabinas near Gomez Farias
<i>P. holochlorus</i>	FMNH111800	NA	Mexico	Tamaulipas	Santa Egracia
<i>P. holochlorus</i>	FMNH189793	F	Mexico	Chiapas	Acacoyagua. Escuintla
<i>P. holochlorus</i>	FMNH208671	M	Mexico	Chiapas	40 min NW of Arriaga. Hacienda Monserrate
<i>P. holochlorus</i>	FMNH208672	F	Mexico	Chiapas	40 min NW of Arriaga. Hacienda Monserrate
<i>P. holochlorus</i>	FMNH208674	F	Mexico	Chiapas	NW of Arriaga. Hcienda Monserrate
<i>P. holochlorus</i>	FMNH122790	M	Mexico	Tamaulipas	60 mi S Victoria at Alicia
<i>P. holochlorus</i>	FMNH355155	NA	captivity	Florida	Busch Gardens
<i>P. holochlorus</i>	AMNH81008	F	Mexico	NA	Montemorelos
<i>P. holochlorus</i>	AMNH81000	F	Mexico	Tamaulipas	Rio Pilon
<i>P. holochlorus</i>	AMNH706221	F	Mexico	San Luis Potosi	Ebano
<i>P. holochlorus</i>	AMNH388713	M	Mexico	Tamaulipas	Rio Sabinas
<i>P. holochlorus</i>	AMNH775907	M	Mexico	Oaxaca. Chiapas Line	10 miles E Tapanatepec
<i>P. holochlorus</i>	AMNH706220	M	Mexico	San Luis Potosi	Ebano
<i>P. holochlorus</i>	AMNH393347	M	Mexico	Tamaulipas	Canon Guiaves
<i>P. holochlorus</i>	AMNH393348	F	Mexico	Tamaulipas	Canon Guiaves
<i>P. holochlorus</i>	USNM155377	M	Mexico	Vera Cruz	El Mirador
<i>P. holochlorus</i>	USNM158511	F	Mexico	Tamaulipas	El Forlon
<i>P. holochlorus</i>	USNM158512	M	Mexico	Tamaulipas	El Forlon
<i>P. holochlorus</i>	USNM158508	NA	Mexico	Tamaulipas	El Forlon
<i>P. holochlorus</i>	USNM158509	F	Mexico	Tamaulipas	El Forlon
<i>P. holochlorus</i>	LSUMZ13319	F	Mexico	Tamaulipas	Giiemes. Rio Corona. 22 mi E of Victoria
<i>P. holochlorus</i>	LSUMZ5159	M	Mexico	Tamaulipas	Victoria. near Guemes on Rio Corona
<i>P. holochlorus</i>	LSUMZ13318	F	Mexico	Tamaulipas	Carion de Galeana
<i>P. holochlorus</i>	LSUMZ43728	M	Mexico	Tamaulipas	5km N Gomez Farias. 300 ft
<i>P. holochlorus</i>	LSUMZ5160	F	Mexico	Tamaulipas	Victoria. near Giiemes
<i>P. holochlorus</i>	LSUMZ5157	F	Mexico	Tamaulipas	Victoria. Rio Corona
<i>P. holochlorus</i>	LSUMZ15017	F	Mexico	San Luis Potosi	Ingenio de San Marco. 1.5 mi E of Rio verde
<i>P. holochlorus</i>	LSUMZ10955	F	Mexico	San Luis Potosi	Cueva Salpitre. Xilitla
<i>P. holochlorus</i>	LSUMZ10954	F	Mexico	San Luis Potosi	El Salto
<i>P. holochlorus</i>	LSUMZ15016	M	Mexico	San Luis Potosi	Micos
<i>P. holochlorus</i>	LSUMZ16771	M	Mexico	San Luis Potosi	El Nacimiento del Coy
<i>P. holochlorus</i>	LSUMZ16770	M	Mexico	San Luis Potosi	Puente de Dios. Rio Santa Maria

<i>P. holochlorus</i>	LSUMZ10953	F	Mexico	San Luis Potosi	El Salto
<i>P. holochlorus</i>	LSUMZ15019	F	Mexico	San Luis Potosi	6 mi E of Sabinito
<i>P. holochlorus</i>	LSUMZ19801	F	Mexico	San Luis Potosi	Tonelaco. Catone chico
<i>P. holochlorus</i>	LSUMZ166805	M	Mexico	Oaxaca	Las Minas. ca mi W Chiapas oaxaca line
<i>P. holochlorus</i>	LSUMZ33041	F	Mexico	Oaxaca	1 mi W La Ventosa
<i>P. holochlorus</i>	LSUMZ15018	M	Mexico	San Luis Potosi	1.5 mi E of Rioverde
<i>P. holochlorus</i>	LSUMZ39655	M	Mexico	Chiapas	6 mi NE of Tonalá. Chiapas
<i>P. holochlorus</i>	LSUMZ43731	M	Mexico	Chiapas	6 mi NE of Tonalá. Chiapas
<i>P. brevipes</i>	LSUMZ65534	F	Guatemala	Santa Rosa	Cuilapa. 15 mi S
<i>P. brevipes</i>	LSUMZ65533	F	Guatemala	Suchitepequez	Patulul
<i>P. brevipes</i>	MNHN508	NA	NA	NA	San Salvador
<i>P. holochlorus</i>	MNHN510	NA	NA	NA	Jamaica
<i>P. rubritorquis</i>	BMNH1890.6.1.42	M	captivity	NA	London
<i>P. rubritorquis</i>	AMNH474425	F	Nicaragua	NA	NA
<i>P. rubritorquis</i>	AMNH143787	M	Nicaragua	Pine region. 3500 ft	San Rafael del Norte
<i>P. rubritorquis</i>	AMNH474426	F	Nicaragua	NA	Matagalpa
<i>P. rubritorquis</i>	AMNH143788	F	Nicaragua	NA	San Rafael del Norte
<i>P. rubritorquis</i>	AMNH143790	F	Nicaragua	NA	Matagalpa
<i>P. rubritorquis</i>	AMNH326001	M	Honduras	Tegucigalpa	Archaga. La Flor. 2050 ft
<i>P. rubritorquis</i>	AMNH325999	F	Honduras	Tegucigalpa	Tegucigalpa
<i>P. rubritorquis</i>	AMNH102434	F	Nicaragua	NA	Matagalpa
<i>P. rubritorquis</i>	AMNH326000	M	Honduras	Tegucigalpa	Archaga. La Flor. 2050 ft
<i>P. rubritorquis</i>	AMNH143791	M	Nicaragua	NA	Matagalpa
<i>P. rubritorquis</i>	USNM348098	F	Honduras	Comayaga	Cerro Cantoral
<i>P. rubritorquis</i>	USNM333068	M	captivity	NA	Natural Zoological Park
<i>P. rubritorquis</i>	USNM132111	F	Guatemala	NA	NA
<i>P. rubritorquis</i>	FMNH95176	F	Guatemala	Zacapa	El Rancho
<i>P. rubritorquis</i>	FMNH22419	M	Guatemala	Zacapa	Gualan
<i>P. rubritorquis</i>	FMNH22418	M	Guatemala	Zacapa	Gualan
<i>P. rubritorquis</i>	FMNH22417	F	Guatemala	Zacapa	Gualan
<i>P. rubritorquis</i>	FMNH22420	M	Guatemala	Zacapa	Gualan
<i>P. rubritorquis</i>	FMNH21864	F	Nicaragua	Jinotega	San Rafael del Norte
<i>P. rubritorquis</i>	FMNH21865	M	Nicaragua	Jinotega	San Rafael del Norte
<i>P. mitratus</i>	USNM41926	NA	Argentina	NA	Beron
<i>P. mitratus</i>	AMNH474347	M	Argentina	Tucuman	NA
<i>P. mitratus</i>	AMNH474342	M	Argentina	Tucuman	Bosques
<i>P. mitratus</i>	AMNH474343	F	Argentina	Tucuman	Bosques
<i>P. mitratus</i>	AMNH474344	M	Argentina	Tucuman	NA
<i>P. mitratus</i>	AMNH474349	F	Argentina	Tucuman	NA
<i>P. mitratus</i>	AMNH474346	M	Argentina	Tucuman	NA
<i>P. mitratus</i>	MACN7436	M	Argentina	Tucuman	NA
<i>P. mitratus</i>	MACN4320	M	Argentina	Salta	NA
<i>P. mitratus</i>	MACN	NA	Argentina	Tucuman	Concepcion
<i>P. mitratus</i>	MACN29187	M	Argentina	Ambato	Catamarca. La Rinconada

<i>P. mitratus</i>	MZUSP3938	M	Argentina	Salta	Rosario
<i>P. mitratus</i>	MNHN507	NA	Bolivia	NA	NA
<i>P. mitratus</i>	MNHN506	M	Bolivia	Santa Cruz	Olgin
<i>P. alticolus</i>	AMNH129136	M	Peru	Cuzco	11.000 ft
<i>P. alticolus</i>	AMNH129138	F	Peru	NA	Cuzco. 11.000 ft
<i>P. alticolus</i>	AMNH129137	F	Peru	NA	Cuzco. 11.000 ft
<i>P. mitratus</i>	FMNH222260	M	Peru	Apurimac	Andahuaylas. Hda.Palmira
<i>P. chlorogenys</i>	FMNH59546	F	Peru	Huanuco	Chinchao
<i>P. mitratus</i>	FMNH222261	M	Peru	Apurimac	Andahuaylas. Hda.Palmira
<i>P. mitratus</i>	AMNH139084	F	Bolivia	Cochabamba	Mizque. 7.500 ft
<i>P. mitratus</i>	AMNH166512	M	Peru	NA	NA
<i>P. mitratus</i>	AMNH139081	M	Bolivia	Cochabamba	Mizque. 7.500 ft
<i>P. mitratus</i>	AMNH139083	F	Bolivia	Cochabamba	Mizque. 7.500 ft
<i>P. chlorogenys</i>	USNM273072	F	Peru	Urubamba	Torontoy
<i>P. mitratus</i>	USNM273073	F	Peru	Urubamba	Machu Picchu
<i>P. chlorogenys</i>	USNM273071	M	Peru	Urubamba	Torontoy
<i>P. mitratus</i>	USNM169139	M	Peru	Cajamarca	Minabamba
<i>P. chlorogenys</i>	LSUMZ73791	F	Peru	Huanuco	Bosque Zapatogocha above Acomayo
<i>P. chlorogenys</i>	LSUMZ73786	F	Peru	Huanuco	base of bosque Zapatogocha above Acomayo. ca 8500
<i>P. chlorogenys</i>	LSUMZ73788	F	Peru	Huanuco	base of bosque Zapatogocha above Acomayo. ca 8500
<i>P. chlorogenys</i>	LSUMZ73789	NA	Peru	Huanuco	base of bosque Zapatogocha above Acomayo. ca 8700
<i>P. chlorogenys</i>	LSUMZ73787	M	Peru	Huanuco	base of bosque Zapatogocha above Acomayo. ca 8600
<i>P. chlorogenys</i>	LSUMZ71366	M	Peru	Juanin	ca 2 km W Pan de Azucar. ca 4400
<i>P. mitratus</i>	LSUMZ123506	M	Bolivia	Santa Cruz	2.5 km N Tambo. Rio San Isidro Valley. 1525 m
<i>P. mitratus</i>	LSUMZ37253	F	Bolivia	Santa Cruz	Achiraz. Florida
<i>P. mitratus</i>	LSUMZ168730	M	Bolivia	Santa Cruz	La Paicha. ca 28 km S Samaipata
<i>P. mitratus</i>	LSUMZ168734	F	Bolivia	Santa Cruz	Chuchial. ca 37 km of Samaipata. 950 m
<i>P. mitratus</i>	LSUMZ168733	M	Bolivia	Santa Cruz	Chuchial. ca 37 km of Samaipata. 950 m
<i>P. mitratus</i>	FMNH58259	M	Argentina	Tucuman	Concepcion
<i>P. mitratus</i>	FMNH58260	F	Argentina	Tucuman	Concepcion
<i>P. mitratus</i>	FMNH58261	NA	Argentina	Tucuman	Concepcion
<i>P. mitratus</i>	FMNH58262	F	Argentina	Tucuman	Concepcion
<i>P. mitratus</i>	FMNH58910	F	Argentina	Tucuman	Las Pavas
<i>P. chlorogenys</i>	AMNH435434	M	Peru	S of Chachapoyas	San Pedro. 8600-9400 ft
<i>P. chlorogenys</i>	AMNH474337	M	Peru	Junin region	Chanchamayo
<i>P. chlorogenys</i>	AMNH234327	M	Peru	N of Chachapoyas	La Lejia. 9000 ft
<i>P. chlorogenys</i>	AMNH234329	F	Peru	N of Chachapoyas	La Lejia. 9000 ft
<i>P. chlorogenys</i>	AMNH234328	M	Peru	N of	La Lejia. 9000 ft

				Chachapoyas	
<i>P. chlorogenys</i>	AMNH235433	M	Peru	S of Chachapoyas	San Pedro. 8600-9400 ft
<i>P. frontatus</i>	AMNH156318	NA	Ecuador	NA	San Lucas
<i>P. wagleri</i>	AMNH188155	F	Venezuela	NA	Rio Neveri. 2400 ft
<i>P. frontatus</i>	AMNH181890	M	Peru	NA	Perico. Rio Chinchipe
<i>P. frontatus</i>	AMNH181891	M	Peru	NA	Perico. Rio Chinchipe
<i>P. wagleri</i>	AMNH474367	M	Venezuela	Sucre	Los dos Rios. St. of Cumana
<i>P. frontatus</i>	AMNH181892	F	Peru	NA	Perico. Rio Chinchipe
<i>P. frontatus</i>	AMNH170918	M	Ecuador	Loja	Lunama'. Prov. De loja
<i>P. frontatus</i>	AMNH803056	NA	Peru	NA	NA
<i>P. frontatus</i>	AMNH461751	M	Peru	Lima	Huariconga. Fortaleza Valley
<i>P. frontatus</i>	AMNH461750	M	Peru	Lima	Huariconga. Pativilca Valley. 1500 ft
<i>P. wagleri</i>	MCZ249706	M	Venezuela	NA	Cuschivano
<i>P. wagleri</i>	USNM88479	M	Venezuela	Puerto Cabello	San Esteban
<i>P. wagleri</i>	USNM351886	M	Venezuela	Aragua	Rancho Grande
<i>P. wagleri</i>	USNM351887	M	Venezuela	Aragua	Rancho Grande
<i>P. wagleri</i>	FMNH188824	M	Venezuela	Aragua	Ocumare de la Costa
<i>P. wagleri</i>	FMNH34529	F	Venezuela	Aragua	Lake Valencia
<i>P. wagleri</i>	FMNH91882	F	Venezuela	Sucre	Mt. Turumiquire
<i>P. wagleri</i>	FMNH91883	M	Venezuela	Sucre	Mt. Turumiquire
<i>P. wagleri</i>	FMNH91881	M	Venezuela	Sucre	Mt. Turumiquire
<i>P. wagleri</i>	FMNH91878	F	Venezuela	Sucre	Mt. Turumiquire
<i>P. wagleri</i>	BMNH1843.5.24.42	NA	Colombia	Bogota	Sante Fe de Bogotá
<i>P. wagleri</i>	MZUSP2270	NA	Colombia	Bogota	NA
<i>P. wagleri</i>	LSUMZ90383	M	Colombia	Magdalena	25 km SE Santa Marta. 7200 ft
<i>P. wagleri</i>	MNHN513	NA	Colombia	NA	NA
<i>P. wagleri</i>	MNHN166	NA	Venezuela	NA	Caracas
<i>P. wagleri</i>	MNHN511	F	Colombia	Magdalena	Minea. Catorra
<i>P. wagleri</i>	MNHN279	NA	NA	NA	NA
<i>P. wagleri</i>	AMNH111439	M	Colombia	Tolima	Chicoral. Coello River
<i>P. wagleri</i>	AMNH474381	NA	Colombia	Bogota	NA
<i>P. wagleri</i>	AMNH71575	F	Colombia	Antioquia	Rio Zapata
<i>P. wagleri</i>	AMNH474379	NA	Colombia	Bogota	NA
<i>P. wagleri</i>	AMNH11438	F	Colombia	Tolima	Chicoral. Coello River
<i>P. wagleri</i>	AMNH115747	F	Colombia	NA	La Sierra. Cen. Andes. Cauca
<i>P. wagleri</i>	AMNH474377	NA	Colombia	Bogota	NA
<i>P. wagleri</i>	AMNH108754	F	Colombia	NA	Palmira 8500 ft. Cauca
<i>P. wagleri</i>	AMNH73192	F	Colombia	NA	Valparaiso
<i>P. wagleri</i>	AMNH474374	M	Colombia	NA	Rio Dagua
<i>P. wagleri</i>	USNM386828	F	Colombia	Rio Guatupuri	Chenducua
<i>P. wagleri</i>	USNM386827	M	Colombia	Rio Guatupuri	Chenducua
<i>P. wagleri</i>	USNM386826	M	Colombia	Rio Guatupuri	Chenducua
<i>P. wagleri</i>	USNM383472	F	Colombia	Sierra Nevada. Santa Marta	Atanquez

<i>P. wagleri</i>	USNM372591	M	Colombia	Sierra Peija. 5300 ft	La Africa
<i>P. wagleri</i>	USNM372596	F	Colombia	Magdalena. Sierra Peija	Eroca
<i>P. wagleri</i>	USNM373594	M	Colombia	Magdalena	Eroca
<i>P. wagleri</i>	USNM373593	F	Colombia	Magdalena	Eroca
<i>P. wagleri</i>	USNM372592	F	Colombia	Sierra Peija. 5300 ft	La Africa
<i>P. wagleri</i>	USNM442905	F	Colombia	Rio Cauca. Paso de lo Jamundi	Valle
<i>P. wagleri</i>	FMNH91880	F	Venezuela	Sucre	Mt. Turumiquire
<i>P. wagleri</i>	FMNH13680	NA	Colombia	Bogota	NA
<i>P. wagleri</i>	FMNH13681	M	Colombia	Bogota	NA
<i>P. wagleri</i>	FMNH255497	M	Colombia	Cauca	Rio Guachicono
<i>P. wagleri</i>	FMNH255498	F	Colombia	Cauca	Rio Guachicono
<i>P. frontatus</i>	ZMB10212	NA	Peru	NA	NA
<i>P. frontatus</i>	LSUMZ77978	F	Peru	Piura	33 km by road SW Huancabamba below Cruz Blanca
<i>P. frontatus</i>	FMNH44119	F	Peru	Cajamarca	Hacienda Limon
<i>P. frontatus</i>	FMNH44120	F	Peru	Cajamarca	Hacienda Limon
<i>P. frontatus</i>	FMNH299861	F	Peru	Lima	Yauyos
<i>P. frontatus</i>	FMNH299860	M	Peru	Lima	Yauyos
<i>P. frontatus</i>	FMNH299862	M	Peru	Lima	Yauyos
<i>P. frontatus</i>	ANSP108178	NA	Peru	La Libertad	Soquian
<i>P. frontatus</i>	LSUMZ91664	M	Peru	La Libertad	Chagual. Rio Marañon. 30 road km E Aricapampa
<i>P. frontatus</i>	LSUMZ91665	NA	Peru	La Libertad	Chagual. Rio Marañon. 30 road km E Aricapampa
<i>P. frontatus</i>	LSUMZ80367	M	Peru	Cajamarca	ca 5 km by rd W Balsas. ca 3400
<i>P. frontatus</i>	LSUMZ75108	M	Peru	Amazonas	Balsas. along Rio Marañon. ca 2700

Appendix 3. List of examined skeletons with nomenclature according to Ferraroni & Silveira taxonomic revision, where “NA” refers to missing data and “complex” to specimens that could not be identified at species level.

Species	Number	Sex	Observations	Locality/Donor
<i>A. ararauna</i>	AMNH3010	NA		Venezuela, W.T. Hornoday
<i>A. ararauna</i>	MZUSP89259	NA	captivity	NA
<i>A. ararauna</i>	MZUSP89307	NA		NA
<i>A. ararauna</i>	MZUSP90421	NA	immature	NA
<i>A. ararauna</i>	MZUSP89242	M		NA
<i>A. ararauna</i>	AMNH3942	F		NA
<i>A. ararauna</i>	AMNH2112	NA	captivity	New York, Zoological Park
<i>A. ararauna</i>	AMNH6274	NA	captivity	NA
<i>A. ararauna</i>	AMNH1035	F	captivity	New York, Zoological Park

<i>A. ararauna</i>	AMNH4316	NA		Guyana
<i>A. ararauna</i>	AMNH2732	NA	captivity	Central Park Zoo
<i>A. ararauna</i>	MZUSP89290	NA	captivity	NA
<i>C. spixii</i>	USNM346722	M		NA
<i>C. spixii</i>	USNM344395	F	trunk	NA
<i>C. spixii</i>	AMNH5204	NA		NA
<i>C. spixii</i>	MZUSP90336	NA		NA
<i>D. nobilis</i>	MZUSP89306	NA		NA
<i>D. nobilis</i>	MZUSP89244	F		NA
<i>D. nobilis</i>	MZUSP90352	NA		NA
<i>D. nobilis</i>	MZUSP89243	M		NA
<i>D. nobilis</i>	MZUSP89260	M		NA
<i>D. nobilis</i>	MZUSP89322	NA	captivity	NA
<i>D. nobilis</i>	MZUSP89269	NA		NA
<i>D. nobilis</i>	MZUSP89261	M	captivity	NA
<i>D. nobilis</i>	MZUSP89305	M		NA
<i>D. nobilis</i>	LSUMZ154944	F	captivity	Robert Berry Aviary.Houston, Texas.
<i>G. guarouba</i>	USNM622396	M	captivity	Phoenix Zoo
<i>G. guarouba</i>	USNM613782	F	captivity	NA
<i>G. guarouba</i>	USNM613781	M	captivity	NA
<i>G. guarouba</i>	AMNH11621	F	captivity	NA
<i>G. guarouba</i>	MZUSP89251	F		NA
<i>G. guarouba</i>	MZUSP89278	M		NA
<i>G. guarouba</i>	LSUMZ86352	F	captivity	Aviary Bird
<i>G. guarouba</i>	FMNH342701	F	captivity	Busch Garderns
<i>G. guarouba</i>	FMNH363733	M	captivity	Busch Garderns
<i>G. guarouba</i>	FMNH398916	F	captivity	Busch Garderns
<i>G. guarouba</i>	BMNHs/1989.26.28	F	captivity	Mr. G.Smith
<i>G. guarouba</i>	BMNHs/2006.51.1	NA	NA	Leeds Museum
<i>L. branickii</i>	LSUMZ89682	F		Dpto.Amazonas, Cordillera Colan,E La Peca, 9550 ft. Peru.
<i>L. branickii</i>	LSUMZ89683	F		Dpto.Amazonas, Cordillera Colan,E La Peca, 9600 ft. Peru.
<i>C. carolinensis</i>	AMNH899	F		Florida, Sebastian River
<i>C. carolinensis</i>	AMNH9572	NA	captivity	New York, Zoological Park
<i>C. carolinensis</i>	AMNH901	F		Florida, Sebastian River
<i>C. carolinensis</i>	AMNH900	F		Florida, Sebastian River
<i>C. carolinensis</i>	AMNH754	M	sternum	NA
<i>C. carolinensis</i>	AMNH755	NA	sternum	NA
<i>C. carolinensis</i>	AMNH756	F	sternum	NA
<i>C. carolinensis</i>	AMNH757	F	sternum	NA
<i>C. carolinensis</i>	AMNH758	M	sternum	NA
<i>C. carolinensis</i>	AMNH759	F	sternum	NA
<i>C. carolinensis</i>	AMNH760	M	sternum	NA
<i>C. carolinensis</i>	AMNH761	M	sternum	NA
<i>C. carolinensis</i>	AMNH762	F	sternum	NA

<i>C. carolinensis</i>	AMNH763	M	sternum	NA
<i>C. carolinensis</i>	AMNH773	M	sternum	NA
<i>C. carolinensis</i>	USNM226477	NA	trunk	NA
<i>C. carolinensis</i>	USNM223857	F	captivity	NA
<i>C. carolinensis</i>	USNM292905	NA		Lake Locke, USA
<i>C. carolinensis</i>	USNM499104	F		Brevard Micco, Florida, USA
<i>C. carolinensis</i>	USNM290364	F	trunk	Padgett Creek, Brevard,Florida, USA
<i>C. carolinensis</i>	USNM290365	M	trunk	Padgett Creek, Brevard,Florida, USA
<i>C. carolinensis</i>	USNM290363	F	trunk	Padgett Creek, Brevard,Florida, USA
<i>C. carolinensis</i>	USNM290366	F	trunk	Padgett Creek, Brevard,Florida, USA
<i>C. carolinensis</i>	USNM004893	NA	skull	Chester, Pennsylvania
<i>O. icterotis</i>	USNM428770	M		Tijeras, Colombia
<i>O. icterotis</i>	USNM428769	F		Tijeras, Colombia
<i>O. manilata</i>	AMNH8506	NA	skull	N.E. Brazil
<i>O. manilata</i>	LSUMZ86453	NA		Dpto. Madre de Dios; Pampas de Heath, ca.50 River km S Pto.Pardo.GLG 1032. Peru
<i>O. manilata</i>	LSUMZ86454	F		Dpto. Madre de Dios; Pampas de Heath, ca.50 River km S Pto.Pardo.GRG 795. Peru
<i>O. manilata</i>	LSUMZ135483	M	captivity	G.Fred Collins Aviaries. Houston, Texas.
<i>O. manilata</i>	LSU136495	F	captivity	G.Fred Collins Aviaries. Houston, Texas.
<i>P. maracana</i>	AMNH2348	F		NA
<i>P. maracana</i>	MZUSP89292	NA		NA
<i>P. maracana</i>	LSUMZ161192	F		Tocantins, Rio Caiapo, near Caseara. Brazil
<i>P. frontalis</i>	MZUSP89238	NA		NA
<i>P. frontalis</i>	MZUSP89317	NA		NA
<i>P. frontalis</i>	AMNH2315	F		NA
<i>P. frontalis</i>	MZUSP89286	NA		NA
<i>P. frontalis</i>	LSUMZ161185	F		São Paulo, Ubatuba, Brazil.
<i>P. frontalis</i>	LSUMZ148705	NA	captivity	Glen Smart Aviary, Cape Girardeau, Missouri
<i>P. frontalis</i>	LSUMZ161191	M		Paraty, RJ, Brazil.
<i>A. nenday</i>	AMNH16514	M	captivity	D.Neibling
<i>A. nenday</i>	MZUSP90426	M		NA
<i>A. nenday</i>	MZUSP89327	NA		NA
<i>A. nenday</i>	USNM345868	M		Bt. Caceres & Concepcion, Brazil.
<i>A. nenday</i>	USNM345869	M		Bt. Caceres & Concepcion, Brazil.
<i>A. nenday</i>	USNM292864	M	trunk, captivity	Natural Zoological Park
<i>A. nenday</i>	USNM291978	F	captivity	Natural Zoological Park
<i>A. nenday</i>	LSUMZ99596	F	captivity	Baton Rouge Zoo, Louisiana
<i>A. nenday</i>	LSUMZ81626	M	captivity	Baton Rouge Zoo, Louisiana
<i>A. nenday</i>	FMNH313394	NA	captivity	NA
<i>A. nenday</i>	FMNH313417	M	captivity	Busch Garderns
<i>A. nenday</i>	FMNH337798	F	captivity	Busch Garderns
<i>A. nenday</i>	FMNH337799	M	captivity	Busch Garderns
<i>A. weddelli</i>	USNM322311	F	captivity	Natural Zoological Park
<i>A. weddelli</i>	USNM291690	F		Bolivia
<i>A. weddelli</i>	USNM319983	F	captivity	Natural Zoological Park

<i>A. weddelli</i>	USNM345865	F		Tres Barras, Rio Paraguay, Brazil
<i>A. weddelli</i>	USNM345866	M		Barras das Bughres & Caceres, Brazil
<i>A. weddelli</i>	USNM345864	F		Tres Barras, Rio Paraguay, Brazil
<i>A. weddelli</i>	USNM345863	M		Tres Barras, Rio Paraguay, Brazil
<i>A. weddelli</i>	LSUMZ52681	F		Dpto. Loreto, rio Caranaja, Balta, Peru.
<i>A. weddelli</i>	LSUMZ131427	M		Dpto. Pando, Prov.Nicolas Suarez, ca 12 km by road S Cabija, ca 8 km W on road to Mucden, 325 m, Bolivia.
<i>A. weddelli</i>	LSUMZ160337	F	captivity	Ed Luber Aviary
<i>A. weddelli</i>	LSUMZ52682	M		Dpto. Loreto, rio Caranaja, Balta, Peru.
<i>A. weddelli</i>	FMNH315170	M		Hda. Amazonia, Madre de Dios, Peru
<i>A. weddelli</i>	FMNH320429	NA		Hda. Amazonia, Madre de Dios, Peru
<i>A. weddelli</i>	FMNH315169	F		Hda. Amazonia, Madre de Dios, Peru
<i>A. weddelli</i>	FMNH337784	M	captivity	National Zool Park
<i>A. solstitialis</i>	USNM343432	NA	captivity	Natural Zoological Park
<i>A. solstitialis</i>	USNM614252	M	captivity	NA
<i>A. solstitialis</i>	USNM612805	M	captivity	NA
<i>A. solstitialis</i>	USNM623405	M	captivity	NA
<i>A. solstitialis</i>	AMNH21070	M	captivity	Bird Jungle
<i>A. solstitialis</i>	AMNH13706	NA	captivity	Novak's Aviary, Guyana
<i>A. solstitialis</i>	LSUMZ166424	F	captivity	Rick Jorda Aviary, Kutztown, Pennsylvania
<i>A. solstitialis</i>	LSUMZ166423	F	captivity	Rick Jorda Aviary, Kutztown, Pennsylvania
<i>A. solstitialis</i>	LSUMZ111755	F	captivity	Audubon Park Zoo, New Orleans, Louisiana
<i>A. solstitialis</i>	LSUMZ166422	M	captivity	Rick Jorda Aviary, Kutztown, Pennsylvania
<i>A. solstitialis</i>	FMNH360310	F	captivity	Busch Gardens
<i>A. solstitialis</i>	FMNH342705	F	captivity	Busch Gardens
<i>A. solstitialis</i>	FMNH347538	NA	captivity	Brookfield Zoo
<i>A. solstitialis</i>	FMNH337781	M	captivity	Busch Gardens
<i>A. solstitialis</i>	BMNHs/2013.25.3	NA	captivity	G. Smith
<i>A. solstitialis</i>	BMNHs/1989.29.2	M	captivity	G. Smith
<i>A. solstitialis</i>	BMNHs/1983.5.2	NA	captivity	G. Smith
<i>A. jandaya</i>	USNM321850	M	captivity	Natural Zoological Park
<i>A. jandaya</i>	USNM344704	F	captivity	Natural Zoological Park
<i>A. jandaya</i>	USNM322098	M	captivity	Natural Zoological Park
<i>A. jandaya</i>	MZUSP89249	NA		NA
<i>A. jandaya</i>	MZUSP89268	M		NA
<i>A. jandaya</i>	AMNH9232	NA	captivity	Texas, Houston (R.Berry)
<i>A. jandaya</i>	AMNH3684	NA	captivity	New York, Zoological Park
<i>A. jandaya</i>	AMNH2399	M		NA
<i>A. jandaya</i>	AMNH9233	F	captivity	Texas, Houston (R.Berry)
<i>A. jandaya</i>	LSUMZ149161	F	captivity	Rick Jordan Aviary, Dripping Springs, Texas
<i>A. jandaya</i>	FMNH337783	M	captivity	A. Moorhouse
<i>A. jandaya</i>	FMNH454877	NA	captivity	NA
<i>A. jandaya</i>	FMNH360309	F	captivity	Busch Gardens
<i>A. jandaya</i>	FMNH337780	M	captivity	NA
<i>A. jandaya</i>	BMNHs/1981.31.8	F	captivity	Burton

<i>A. auricapillus</i>	MZUSP90429	F		NA
<i>A. auricapillus</i>	MZUSP89250	F		NA
<i>A. auricapillus</i>	LSUMZ164606	M	captivity	Clarence Killian Aviary, Mc Kinney, Texas.
<i>A. auricapillus</i>	FMNH342703	NA	captivity	Busch Gardens
<i>T. acuticaudatus</i> complex	BMNH1872.7.10.3	NA	captivity	Zoological Society London
<i>T. haemorrhous</i>	BMNH1869.12.22.6	NA	captivity	Zoological Society London
<i>T. acuticaudatus</i>	BMNHs/1955.5.47	NA	captivity	Paraguay. Rothschild request
<i>T. acuticaudatus</i> complex	BMNHs/1994.51.1	NA	captivity	M. Walker
<i>T. acuticaudatus</i>	USNM227478	M	trunk	Formosa, Argentina. Km 182
<i>T. acuticaudatus</i>	USNM227548	M	trunk	Victorica, Pampa argentina
<i>T. acuticaudatus</i>	USNM227773	F		Tucuman, Tapia. Argentina
<i>T. acuticaudatus</i> complex	AMNH1398	NA		NA
<i>T. acuticaudatus</i>	AMNH6907	M		Argentina, Formosa:14 km, NW Espinillo
<i>T. acuticaudatus</i> complex	MZUSP90355	NA		NA
<i>T. acuticaudatus</i> complex	LSUMZ148709	F	captivity	Glen Smart Aviary, Cape Girardeau, Missouri
<i>T. acuticaudatus</i> complex	LSUMZ136503	M	captivity	Noah's Pet Shop, Baton Rouge, Louisiana
<i>T. acuticaudatus</i>	LSUMZ125695	M		Dpto. Santa Cruz, Prov. Caballero, 25 km N Tambo, Rio San Isidro, Rio Pulquina Valley, 1500 m
<i>T. acuticaudatus</i> complex	LSUMZ68719	M	captivity	Dallas Zoo
<i>T. haemorrhous</i>	FMNH298007	F		Carimagua, Meta, Colombia
<i>T. acuticaudatus</i> complex	FMNH337762	M	captivity	Busch Gardens
<i>P. wagleri</i> complex	BMNHs/2006.51.2	F	captivity	G. Smith
<i>P. wagleri</i> complex	BMNHs/2013.10.1	F	captivity	G. Smith
<i>P. wagleri</i> complex	BMNHs/2002.4.5	F	captivity	G. Smith
<i>P. wagleri</i> complex	BMNHs/2006.56.5	NA	captivity	G. Smith
<i>P. wagleri</i>	AMNH3387	NA		Venezuela
<i>P. wagleri</i> complex	AMNH3520	NA	captivity	Central Park Zoo
<i>P. frontatus</i>	LSUMZ93856	M		Dpto. La Libertad, Chagual, Rio Maranon, 30 km E Aricapampa, 1050 m, Peru.
<i>P. frontatus</i>	LSUMZ114313	F		Dpto.Lambayuegue, Las Pampas, km 885 Pan-American, 11 road km N Olmas, 150m, Peru.
<i>P. wagleri</i>	FMNH337766	M		Portachuelo Pass, Aragua, Venezuela
<i>P. wagleri</i> complex	FMNH347539	NA	captivity	Brookfield Zoo
<i>P. wagleri</i>	FMNH337767	M		Portachuelo Pass, Aragua, Venezuela
<i>P. holochlorus</i> complex	USMN346173	NA	captivity	New York, Zoological Park
<i>P. holochlorus</i> complex	USNM322297	M	captivity	New York, Zoological Park
<i>P. holochlorus</i> complex	USNM358093	F	captivity	Schmid's Inc.
<i>P. holochlorus</i>	BMNH1869.12.22.2	F	captivity	Mexico
<i>P. holochlorus</i> complex	BMNHs/1991.44.10	NA	captivity	NA

<i>P. holochlorus</i> complex	BMNHs/1991.1.32	NA	died in transit	NA
<i>P. holochlorus</i>	LSUMZ168096	F	captivity	Texas
<i>P. holochlorus</i>	LSUMZ113239	M		Tamaulipas, 7 km SW La Purisima, Mexico.
<i>P. holochlorus</i>	FMNH317857	F		Chiapa de Corzo, Chiapas, Mexico
<i>P. holochlorus</i> complex	FMNH379147	F	captivity	Busch Gardens
<i>P. rubritorquis</i>	FMNH376410	M		Volcan Santiago, Masaya, Nicaragua
<i>Psittacara holochlorus</i>	FMNH337765	M		Piedras negras, Veracruz, Mexico
<i>P. finschi</i>	USNM613366	M		Bocas del Toro, Panama. Cayo Agua near Punta Limon
<i>P. finschi</i>	USNM613365	F		Bocas del Toro, Panama. Cayo Agua near Punta Limon
<i>P. finschi</i>	USNM612288	F		Bocas del Toro, Panama. Quebrada Pastores.
<i>P. finschi</i>	USNM612287	M		Bocas del Toro. Panama. Isla Cristobal, Bocatorito
<i>P. finschi</i>	LSUMZ166372	F		prov. Alajuelai near Canalete, 10°48'N, 85°01'W, 190 m, Costa Rica.
<i>P. finschi</i>	LSUMZ48553	F		Prov. Heredia, 2 mi SE Puerto Viejo, Costa Rica.
<i>P. brevipes</i>	USNM343478	F		Tecpam, Guatemala
<i>P. chlorogenys</i>	LSUMZ77786	M		Dpto. Huanuco, below Bosque Zapatagocha, above Acomayo, Peru.
<i>P. leucophthalmus</i>	USNM344612	M	captivity	New York, Zoological Park
<i>P. leucophthalmus</i>	USNM345867	M		Bt. Caceres & Concepcion, Brazil.
<i>P. leucophthalmus</i>	USNM344083	M		Carapito, Venezuela
<i>P. leucophthalmus</i>	USNM609517	M	immature	Corrientes, Argentina. 45 km S, Manuel Derqui, 25°50'30"S, 058°48'42"W, 200m
<i>P. leucophthalmus</i>	USNM343822	M	captivity	Natural Zoological Park
<i>P. leucophthalmus</i>	MZUSP89308	M		NA
<i>P. leucophthalmus</i>	AMNH6671	F		Argentina, misiones, 8 km SW São Pedro
<i>P. leucophthalmus</i>	AMNH2361	NA	captivity	New York, Zoological Park
<i>P. leucophthalmus</i>	MZUSP89309	M		NA
<i>P. leucophthalmus</i>	LSUMZ161193	NA	captivity	São Paulo Zoo, Brazil.
<i>P. leucophthalmus</i>	LSUMZ125700	M		Dpto. Santa Cruz, Prov. Nuflo de Chaves, 28 km by road S San Javier, 375 m, Bolivia.
<i>P. leucophthalmus</i>	LSUMZ125699	M		Dpto. Beni, Prov. Gral. Ballivian, 10 km by road SW San Borja, 450 m, Bolivia.
<i>P. leucophthalmus</i>	LSUMZ125698	F		Dpto. Beni, Prov. Gral. Ballivian, 10 km by road SW San Borja, 450 m, Bolivia.
<i>P. leucophthalmus</i>	LSUMZ125697	F		Dpto. Beni, Prov. Gral. Ballivian, 10 km by road SW San Borja, 450 m, Bolivia.
<i>P. leucophthalmus</i>	LSUMZ125696	F		Dpto. Beni, Prov. Gral. Ballivian, 10 km by road SW San Borja, 450 m, Bolivia.
<i>P. leucophthalmus</i>	LSUMZ62744	M		Dpto. Loreto, rio Caranaja, Balta, ca 300m, Peru.
<i>P. leucophthalmus</i>	LSUMZ73061	F		Dpto. Huanuco, ca 35 km NE Tingo Maria, Hac. Sta.Elena, ca 1000m, Peru.
<i>P. leucophthalmus</i>	FMNH290911	NA		Argentina
<i>P. leucophthalmus</i>	FMNH290913	M		Argentina
<i>P. leucophthalmus</i>	FMNH320428	M		Hacienda Amazonia, Madre de Dios, Peru

<i>P. leucophthalmus</i>	FMNH320427	F		Hacienda Amazonia, Madre de Dios, Peru
<i>P. leucophthalmus</i>	BMNH1903.12.20.237	M		Sierra da Chapada, P. Sladen
<i>P. leucophthalmus</i>	BMNH1903.12.20.236	M		Sierra da Chapada, P. Sladen
<i>P. euops</i>	USNM557503	M		Sierra de Cubitas, Los Cuevas del Indio. Cuba
<i>P. euops</i>	USNM320005	M	trunk	NA
<i>P. euops</i>	USNM346686	M	captivity	Natural Zoological Park
<i>P. euops</i>	USNM320209	M	trunk	E.S. Schmid
<i>P. euops</i>	AMNH1040	M	captivity	Central Park Zoo
<i>P. euops</i>	AMNH3662	NA	captivity	New York, Zoological Park
<i>P. erythrogegens</i>	AMNH18380	M		NA
<i>P. erythrogegens</i>	AMNH18377	M		NA
<i>P. erythrogegens</i>	AMNH18373	M		NA
<i>P. erythrogegens</i>	AMNH18378	F		NA
<i>P. erythrogegens</i>	AMNH18376	M		NA
<i>P. erythrogegens</i>	AMNH18379	M		NA
<i>P. erythrogegens</i>	AMNH18375	M		NA
<i>P. erythrogegens</i>	AMNH14310	F	captivity	Peru, Novak's Aviary
<i>P. erythrogegens</i>	AMNH18374	M		NA
<i>P. erythrogegens</i>	AMNH14311	M	captivity	Peru, Novak's Aviary
<i>P. erythrogegens</i>	AMNH2563	NA	captivity	New York, Zoological Park
<i>P. erythrogegens</i>	BMNHs/1985.67.2	M	captivity	G. Smith
<i>P. erythrogegens</i>	BMNHs/1997.48.2	NA	captivity	G. Smith
<i>P. erythrogegens</i>	BMNHs/1972.1.80	NA		Ecuador
<i>P. erythrogegens</i>	LSUMZ97460	F		Dpto. Piura, km 34 on Olmos-Bagua Chica Hwy, 4200 ft, Peru
<i>P. erythrogegens</i>	LSUMZ86456	M		Dpto. Rura, 46 rd km SW Ayacaba on Rio Quiroz 2250, Peru
<i>P. erythrogegens</i>	LSUMZ86455	M		Dpto. Lambayegue, 12 Rd km N Olmos, Peru
<i>P. erythrogegens</i>	LSUMZ77709	NA		Dpto. Tumbes, Riva Playa, rio Tumbes, Peru
<i>P. erythrogegens</i>	LSUMZ75596	F		Dpto. Tumbes, Riva Playa, rio Tumbes, Peru
<i>P. erythrogegens</i>	FMNH337768	NA	captivity	Dept. Agriculture
<i>P. erythrogegens</i>	FMNH342702	NA	captivity	R and L exotic birds
<i>P. chloropterus</i>	USNM226537	M		El Rio, Dominican Republic
<i>P. chloropterus</i>	USNM292565	M		Cerca La Source, Haiti
<i>P. chloropterus</i>	USNM292566	F		Cerca La Source, Haiti
<i>P. chloropterus</i>	USNM227068	F		Fonds Parisien, Haiti
<i>P. chloropterus</i>	USNM290994	NA		Massif de la Selle, Haiti
<i>P. chloropterus</i>	USNM291570	M	captivity	Natural Zoological Park
<i>P. chloropterus</i>	USNM226538	NA		Constanza, Saint Domingo
<i>P. chloropterus</i>	AMNH2581	M	captivity	New York, Zoological Park
<i>P. chloropterus</i>	FMNH350812	F	captivity	T. Silva
<i>P. chloropterus</i>	FMNH337772	M	captivity	Busch Gardens
<i>P. chloropterus</i>	FMNH337771	M	captivity	Busch Gardens
<i>E. aurea</i>	MZUSP89288	M	captivity	NA
<i>E. aurea</i>	MZUSP89265	M		NA
<i>E. aurea</i>	MZUSP89266	M		NA

<i>E. aurea</i>	MZUSP90384	NA		NA
<i>E. aurea</i>	MZUSP90348	NA		NA
<i>E. aurea</i>	MZUSP89267	M		NA
<i>E. aurea</i>	MZUSP89252	F		NA
<i>E. aurea</i>	MZUSP89289	F		NA
<i>E. aurea</i>	AMNH1802	NA		NA
<i>E. aurea</i>	AMNH3948	NA	captivity	New York, Zoological Park
<i>E. aurea</i>	USNM321596	NA		San Matheos, Brazil
<i>E. aurea</i>	USNM345862	M		Near Tres Barras, Head Rio Paraguay, Mato Grosso, Brazil
<i>E. aurea</i>	USNM289767	F	captivity	P.Standley
<i>E. aurea</i>	USNM345861	F		Near Tres Barras, Rio Paraguay, Mato Grosso, Brazil
<i>E. aurea</i>	USNM288216	NA	captivity	Rio Beni, Bolivia
<i>E. aurea</i>	LSUMZ161194	M	captivity	São Paulo Zoo, Brazil.
<i>E. aurea</i>	LSUMZ125701	M		Dpto. Santa Cruz, prov. Ibanez, 1 km N, 1 km E YPFB Refinery, ca 10 km S Santa Cruz, 425 m, Bolivia.
<i>E. aurea</i>	FMNH350814	M	captivity	T Silva
<i>E. aurea</i>	FMNH337794	F	captivity	Busch Gardens
<i>E. aurea</i>	FMNH337795	M	captivity	Busch Gardens
<i>E. astec</i>	USNM428270	M	captivity	Natural Zoological Park
<i>E. astec</i>	USNM606739	F		Bocas del Toro. Panama. Isla Cristobal, Bocatorito
<i>E. astec</i>	USMN612289	M		Bocas del Toro. Panama. Isla Cristobal, Bocatorito
<i>E. astec</i>	AMNH12645	NA		Mexico, Tamaulipas
<i>E. astec</i>	AMNH12576	NA		Mexico, Tamaulipas
<i>E. astec</i>	BMNH1869.10.19.31	NA	captivity	Zoological Society London
<i>E. astec</i>	LSUMZ31850	F		Sta. Barbara, 4 mi SW Jaral 3000, Honduras.
<i>E. astec</i>	FMNH317858	F		20 km S Jesus Carranza, Veracruz, Mexico
<i>E. nana</i>	USNM559177	F		Trelawny, 7 mi N of Quickstep, Jamaica.
<i>E. nana</i>	USNM559173	M		Trelawny, 9.5 mi N of Quickstep, Jamaica.
<i>E. nana</i>	USNM558862	M		Trelawny, Quickstep, Jamaica
<i>E. nana</i>	USNM559174	M		Trelawny, 1.5 mi N of Quickstep, Jamaica.
<i>E. nana</i>	USNM558865	M		Trelawny, 1 m N of Quickstep, Jamaica
<i>E. nana</i>	USNM558863	M		Trelawny, Quickstep, Jamaica
<i>E. nana</i>	USNM559172	M		Trelawny, 5.9 mi N of Quickstep, Jamaica.
<i>E. nana</i>	LSUMZ162139	M		prov. Alajuela, 16 km NNE Pital Chaparron, Costa Rica.
<i>E. nana</i>	FMNH337785	F		Tortuguero, Limon, Costa Rica
<i>E. nana</i>	BMNH1847.6.16.43	NA	sternum	Gosse
<i>E. pertinax</i> complex	MZUSP89253	M		NA
<i>E. pertinax</i> complex	AMNH12904	M	captivity	Novak's Aviary, Guyana
<i>E. pertinax</i> complex	AMNH14313	M	captivity	Novak's Aviary, Guyana
<i>E. pertinax</i> complex	AMNH12902	M	captivity	Novak's Aviary, Guyana
<i>E. pertinax</i> complex	BMNHs/1990.3.1	NA	captivity	London
<i>E. pertinax</i> complex	AMNH3383	M		NA

<i>E. pertinax</i> complex	AMNH4955	NA	captivity	New York, Zoological Park
<i>E. ocularis</i>	USNM347334	M		Los Santos, Monagre, 5 mi NE, Panama
<i>E. ocularis</i>	USNM431633	M		Cocle, Potrero, Panama.
<i>E. chrysophrys</i>	USNM621059	M		Berbice District, West Bank Berbice River, Dubulay Ranch, 05°40'N 057°53' W. Guyana
<i>E. ocularis</i>	USNM429194	M		Llano del Jardino, Sona Veraguas, 15 miles E, Panama
<i>E. ocularis</i>	USNM347335	F		Los Santos, Monagre, 5 mi NE, Panama
<i>E. margaritensis</i>	FMNH337793	F		Upata, Bolivar, Venezuela
<i>E. margaritensis</i>	USNM344084	F		Carapito, Venezuela
<i>E. margaritensis</i>	LSUMZ68993	M		Aragua, El Limon M.Castro 53, Venezuela.
<i>E. pertinax</i>	USNM499069	F		Curaçao, Lesser Antillies
<i>E. aeruginosa</i>	FMNH297429	M		Carimagua, Meta, Colombia
<i>E. surinama</i>	FMNH105571	F		Buxton, Demerara, British Guiana
<i>E. surinama</i>	FMNH105572	F		Buxton, Demerara, British Guiana
<i>E. canicularis</i>	AMNH6267	NA	captivity	Central Park Zoo
<i>E. canicularis</i>	AMNH8316	M		Guatemala
<i>E. canicularis</i>	AMNH16760	F	captivity	Aviary Bid
<i>E. canicularis</i>	AMNH2861	F	captivity	New York, Zoological Park
<i>E. canicularis</i>	AMNH8216	NA		NA
<i>E. canicularis</i>	AMNH8318	NA		Guatemala
<i>E. canicularis</i>	USNM346606	M	captivity	Natural Zoological Park
<i>E. canicularis</i>	USNM292922	M	captivity	Natural Zoological Park
<i>E. canicularis</i>	USNM320001	NA		E.S. Schmid
<i>E. canicularis</i>	USNM319452	F	captivity	Natural Zoological Park
<i>E. canicularis</i>	USNM322651	F	captivity	Natural Zoological Park
<i>E. canicularis</i>	USNM322006	NA	captivity	Mrs C.H.Popende
<i>E. canicularis</i>	USNM346175	NA	captivity	Natural Zoological Park
<i>E. canicularis</i>	AMNH8317	NA		Guatemala
<i>E. canicularis</i>	LSUMZ71110	M	captivity	Houston Zoological garden
<i>E. canicularis</i>	LSUMZ71109	F	captivity	Houston Zoological garden
<i>E. canicularis</i>	LSUMZ48552	M		Guanacasta, prov.Bebedero, km 2073, Costa Rica.
<i>E. canicularis</i>	LSUMZ31851	F		Choluteca, 6 mi NE Choluteca, 200, Honduras.
<i>E. canicularis</i>	LSUMZ160336	F	captivity	Ed Luber Aviary
<i>E. canicularis</i>	FMNH376411	F		Los Chocoyos, Managua, Nicaragua
<i>E. canicularis</i>	FMNH337787	F		Finca Jimenez, Guanacaste, Costa Rica
<i>E. canicularis</i>	FMNH337786	F		Finca Jimenez, Guanacaste, Costa Rica
<i>E. canicularis</i>	FMNH376412	F		Los Chocoyos, Managua, Nicaragua

Appendix 4. Combined datasets including 40 osteological and 45 plumage characters, codified for 37 ingroup and 10 outgroup taxa.

Taxon	Char1	Char2	Char3	Char4	Char5	Char6	Char7	Char8	Char9	Char10	Char11	Char12
<i>A. ararauna</i>	0	0	0	0	1	1	1	0	1	1	1	1
<i>D. nobilis</i>	0	0	0	0	1	0	0	1	0	1	1	1
<i>G. guarouba</i>	0	0	0	0	1	0	0	0	1	1	1	1
<i>C. carolinensis</i>	0	1	?	0	0	0	1	1	0	0	0	0
<i>T. acuticaudatus</i>	0	0	1	0	1	0	[0 1]	1	0	0	1	1
<i>P. wagleri</i>	0	0	1	1	1	0	0	1	1	0	1	1
<i>P. holochlorus</i>	0	1	1	0	1	0	1	1	0	1	1	1
<i>P. finschi</i>	0	1	1	0	1	0	1	1	0	1	1	1
<i>P. brevipes</i>	0	1	?	0	0	1	1	1	0	1	1	1
<i>P. chlorogenys</i>	0	1	0	0	0	0	1	1	0	1	1	1
<i>P. leucophthalmus</i>	0	1	0	1	1	0	1	1	0	1	1	1
<i>P. euops</i>	0	0	0	0	1	0	1	1	0	?	0	0
<i>P. erythrogyens</i>	0	0	0	0	1	0	1	1	0	0	1	1
<i>P. chloropterus</i>	0	1	1	1	0	1	1	1	0	1	1	0
<i>A. nenday</i>	1	1	0	0	1	0	0	0	[0 1]	1	1	0
<i>A. weddellii</i>	[0 1]	1	1	0	0	1	1	0	1	1	1	1
<i>A. auricapillus</i>	0	1	0	0	1	0	0	0	0	1	1	0
<i>A. jandaya</i>	0	0	0	0	1	0	0	0	1	[0 1]	1	0
<i>A. solstitialis</i>	1	1	0	0	1	1	0	0	0	1	0	1
<i>E. astec</i>	0	0	0	0	1	0	0	1	1	1	1	1
<i>E. pertinax</i>	0	1	0	0	1	0	0	0	0	1	0	0
<i>E. nana</i>	1	1	0	0	1	0	0	1	1	1	1	1
<i>E. canicularis</i>	0	1	0	0	1	0	0	0	0	0	0	0
<i>E. aurea</i>	1	1	0	0	1	0	0	0	[0 1]	1	0	0
<i>C. spixii</i>	1	1	0	0	0	1	0	0	1	0	1	0
<i>L. branickii</i>	0	0	1	0	1	0	0	0	0	1	1	0
<i>O. icterotis</i>	1	0	0	0	0	0	1	1	1	1	1	1
<i>O. manilata</i>	0	1	0	0	1	1	0	0	0	1	1	1
<i>P. maracana</i>	0	1	0	1	1	[0 1]	0	0	1	[0 1]	0	1
<i>P. frontalis</i>	1	0	0	0	1	0	0	0	0	0	0	0
<i>T. haemorrhous</i>	1	0	1	0	1	0	1	1	1	0	1	1
<i>P. frontatus</i>	0	0	1	0	1	0	0	1	1	1	1	1
<i>P. rubritorquis</i>	0	1	0	0	0	0	1	1	1	1	?	1
<i>E. surinama</i>	0	1	0	0	0	0	0	?	0	1	0	0
<i>E. aeruginosa</i>	?	?	?	?	?	?	?	?	?	?	?	?
<i>E. margaritensis</i>	0	1	0	0	1	0	0	0	0	1	0	0
<i>E. ocularis</i>	0	1	?	0	1	0	0	1	0	1	0	0
<i>E. chrysophrys</i>	0	1	?	0	1	0	0	1	0	1	0	0
<i>E. cactorum</i>	?	?	?	?	?	?	?	?	?	?	?	?
<i>E. tortugensis</i>	?	?	?	?	?	?	?	?	?	?	?	?
<i>E. arubensis</i>	?	?	?	?	?	?	?	?	?	?	?	?
<i>E. paraensis</i>	?	?	?	?	?	?	?	?	?	?	?	?
<i>E. xanthogenia</i>	?	?	?	?	?	?	?	?	?	?	?	?
<i>P. mitratus</i>	?	?	?	?	?	?	?	?	?	?	?	?
<i>A. maculata</i>	?	?	?	?	?	?	?	?	?	?	?	?
<i>P. maugei</i>	?	?	?	?	?	?	?	?	?	?	?	?
<i>P. alticolus</i>	?	?	?	?	?	?	?	?	?	?	?	?

Taxon	Char13	Char14	Char15	Char16	Char17	Char18	Char19	Char20	Char21	Char22	Char23	Char24
<i>A. ararauna</i>	1	1	0	0	0	1	0	1	0	0	0	0
<i>D. nobilis</i>	0	0	0	0	0	1	0	1	1	1	0	0
<i>G. guarouba</i>	0	1	1	0	0	0	0	1	0	1	1	1
<i>C. carolinensis</i>	1	0	1	0	1	1	1	1	1	1	1	0
<i>T. acuticaudatus</i>	0	1	[0 1]	[0 1]	0	1	0	1	0	1	1	[0 1]
<i>P. wagleri</i>	0	1	1	1	0	1	0	1	0	1	0	0
<i>P. holochlorus</i>	0	0	0	1	0	1	0	1	1	1	1	1
<i>P. finschi</i>	0	1	0	1	1	1	0	1	1	1	1	1
<i>P. brevipes</i>	0	0	?	?	?	?	0	1	1	1	1	1
<i>P. chlorogenys</i>	0	1	0	0	0	1	0	1	1	1	1	1
<i>P. leucophthalmus</i>	0	0	0	0	0	1	1	1	1	1	1	0
<i>P. euops</i>	1	0	1	1	0	1	1	1	1	1	0	0
<i>P. erythrogenys</i>	0	0	0	0	0	1	1	1	1	1	1	0
<i>P. chloropterus</i>	0	0	1	0	0	1	1	1	1	1	1	0
<i>A. nenday</i>	1	0	0	1	0	0	0	1	[0 1]	0	0	0
<i>A. weddellii</i>	0	0	0	0	1	0	1	1	0	0	1	0
<i>A. auricapillus</i>	0	0	0	0	1	0	0	1	1	0	[0 1]	0
<i>A. jandaya</i>	1	0	0	1	0	0	0	0	0	0	0	0
<i>A. solstitialis</i>	1	0	0	1	1	0	0	0	0	0	0	0
<i>E. astec</i>	1	0	0	0	0	1	0	0	0	1	1	1
<i>E. pertinax</i>	1	0	0	0	0	0	0	1	0	1	1	1
<i>E. nana</i>	1	0	1	0	0	0	0	1	0	1	0	1
<i>E. canicularis</i>	1	0	0	1	0	0	1	1	0	1	1	0
<i>E. aurea</i>	1	0	0	1	1	0	0	1	[0 1]	1	0	0
<i>C. spixii</i>	0	1	0	1	0	0	0	0	0	0	0	0
<i>L. branickii</i>	0	0	1	1	0	0	1	0	0	1	1	1
<i>O. icterotis</i>	0	1	0	1	0	0	0	1	1	0	0	0
<i>O. manilata</i>	0	1	1	1	0	0	1	0	0	0	1	1
<i>P. maracana</i>	1	[0 1]	0	[0 1]	0	0	0	1	0	[0 1]	[0 1]	0
<i>P. frontalis</i>	0	0	0	1	0	0	0	1	0	1	1	0
<i>T. haemorrhous</i>	0	1	1	0	0	1	0	1	0	1	0	0
<i>P. frontatus</i>	0	1	1	1	0	1	0	1	0	1	0	0
<i>P. rubritorquis</i>	0	0	?	1	0	1	0	1	?	?	1	1
<i>E. surinama</i>	1	?	0	?	?	?	?	1	0	1	0	1
<i>E. aeruginosa</i>	?	?	?	?	?	?	?	?	?	?	?	?
<i>E. margaritensis</i>	1	0	0	0	0	0	0	1	0	1	0	1
<i>E. ocularis</i>	1	0	0	0	0	0	1	1	0	1	1	1
<i>E. chrysophrys</i>	1	0	0	0	0	0	1	1	0	1	1	1
<i>E. cactorum</i>	?	?	?	?	?	?	?	?	?	?	?	?
<i>E. tortugensis</i>	?	?	?	?	?	?	?	?	?	?	?	?
<i>E. arubensis</i>	?	?	?	?	?	?	?	?	?	?	?	?
<i>E. paraensis</i>	?	?	?	?	?	?	?	?	?	?	?	?
<i>E. xanthogenia</i>	?	?	?	?	?	?	?	?	?	?	?	?
<i>P. mitratus</i>	?	?	?	?	?	?	?	?	?	?	?	?
<i>A. maculata</i>	?	?	?	?	?	?	?	?	?	?	?	?
<i>P. maugei</i>	?	?	?	?	?	?	?	?	?	?	?	?
<i>P. alticolus</i>	?	?	?	?	?	?	?	?	?	?	?	?

Taxon	Char25	Char26	Char27	Char28	Char29	Char30	Char31	Char32	Char33	Char34	Char35	Char36
<i>A. ararauna</i>	0	1	1	1	1	1	[0 1]	0	1	1	0	1
<i>D. nobilis</i>	1	1	0	1	0	1	1	0	1	0	0	0
<i>G. guarouba</i>	0	1	1	1	0	1	1	0	1	0	1	1
<i>C. carolinensis</i>	1	1	0	0	1	0	0	0	1	1	0	1
<i>T. acuticaudatus</i>	0	1	0	1	0	0	0	0	1	1	0	1
<i>P. wagleri</i>	1	1	1	1	0	0	1	0	1	0	0	0
<i>P. holochlorus</i>	1	1	0	1	[0 1]	0	0	0	1	0	0	1
<i>P. finschi</i>	1	1	0	1	1	1	0	0	0	0	0	1
<i>P. brevipes</i>	1	1	0	1	1	1	1	0	1	1	0	1
<i>P. chlorogenys</i>	0	1	0	1	1	1	1	0	0	0	0	1
<i>P. leucophthalmus</i>	1	1	0	1	1	1	0	0	0	0	0	1
<i>P. euops</i>	1	1	0	1	0	?	1	0	0	1	0	1
<i>P. erythrogenys</i>	0	1	0	1	1	1	0	0	0	1	0	1
<i>P. chloropterus</i>	1	0	0	1	1	1	0	0	0	0	0	1
<i>A. nenday</i>	1	0	0	0	1	1	0	0	0	1	0	1
<i>A. weddellii</i>	0	1	0	0	0	1	0	1	0	1	0	1
<i>A. auricapillus</i>	0	0	0	0	1	0	0	0	[0 1]	0	0	1
<i>A. jandaya</i>	1	0	1	1	1	0	0	0	0	0	0	1
<i>A. solstitialis</i>	1	1	1	0	1	0	1	0	0	0	0	1
<i>E. astec</i>	1	1	0	1	1	?	[0 1]	0	[0 1]	0	0	1
<i>E. pertinax</i>	0	0	0	1	0	1	1	0	1	0	0	1
<i>E. nana</i>	1	1	0	1	0	1	1	0	1	1	0	1
<i>E. canicularis</i>	0	1	0	1	0	1	1	0	1	0	0	1
<i>E. aurea</i>	0	0	0	1	0	1	1	0	1	0	0	1
<i>C. spixii</i>	0	1	1	1	0	1	1	1	1	1	1	1
<i>L. branickii</i>	0	1	1	1	0	?	1	0	1	0	0	1
<i>O. icterotis</i>	0	1	1	1	0	?	0	0	0	0	0	1
<i>O. manilata</i>	0	1	1	1	0	1	1	1	0	0	1	1
<i>P. maracana</i>	0	1	1	1	1	?	0	0	0	1	[0 1]	1
<i>P. frontalis</i>	1	0	0	1	0	1	1	0	1	1	0	1
<i>T. haemorrhous</i>	0	1	0	1	0	1	0	0	1	1	0	1
<i>P. frontatus</i>	1	1	1	1	[0 1]	0	1	0	0	0	0	1
<i>P. rubritorquis</i>	0	?	0	1	1	0	0	0	1	0	0	1
<i>E. surinama</i>	0	0	0	1	0	1	1	0	1	0	0	1
<i>E. aeruginosa</i>	?	?	0	1	1	1	1	0	1	0	0	1
<i>E. margaritensis</i>	0	0	0	1	0	1	1	0	[0 1]	1	0	1
<i>E. ocularis</i>	0	0	0	1	0	1	1	0	1	0	0	1
<i>E. chrysochrysis</i>	0	0	0	1	0	1	1	0	1	0	0	1
<i>E. cactorum</i>	?	?	?	?	?	?	?	?	?	?	?	?
<i>E. tortugensis</i>	?	?	?	?	?	?	?	?	?	?	?	?
<i>E. arubensis</i>	?	?	?	?	?	?	?	?	?	?	?	?
<i>E. paraensis</i>	?	?	?	?	?	?	?	?	?	?	?	?
<i>E. xanthogenia</i>	?	?	?	?	?	?	?	?	?	?	?	?
<i>P. mitratus</i>	?	?	?	?	?	?	?	?	?	?	?	?
<i>A. maculata</i>	?	?	?	?	?	?	?	?	?	?	?	?
<i>P. maugei</i>	?	?	?	?	?	?	?	?	?	?	?	?
<i>P. alticolus</i>	?	?	?	?	?	?	?	?	?	?	?	?

Taxon	Char37	Char38	Char39	Char40	Char41	Char42	Char43	Char44	Char45	Char46	Char47	Char48
<i>A. ararauna</i>	1	1	0	0	2	0	0	1	0	1	2	0
<i>D. nobilis</i>	1	1	0	[0 1]	0	0	1	1	0	1	0	0
<i>G. guarouba</i>	0	1	1	0	0	0	0	0	0	0	0	0
<i>C. carolinensis</i>	0	1	1	0	1	1	0	1	0	0	2	0
<i>T. acuticaudatus</i>	1	1	0	0	0	1	1	0	0	0	0	0
<i>P. wagleri</i>	1	1	1	?	0	1	0	0	0	0	2	1
<i>P. holochlorus</i>	1	1	1	0	0	1	0	0	0	0	0	0
<i>P. finschi</i>	1	1	0	0	0	0	0	0	2	1	2	1
<i>P. brevipes</i>	0	0	?	1	0	1	0	0	0	0	0	0
<i>P. chlorogenys</i>	1	1	0	0	0	1	0	0	0	1	2	1
<i>P. leucophthalmus</i>	1	1	1	0	0	1	0	0	0	0	0	0
<i>P. euops</i>	0	0	1	1	0	1	0	0	0	0	0	0
<i>P. erythrogenys</i>	0	1	1	0	0	1	0	0	0	0	2	1
<i>P. chloropterus</i>	0	0	0	0	0	1	0	0	0	0	0	0
<i>A. nenday</i>	1	1	[0 1]	[0 1]	2	0	0	0	1	0	[0 1]	0
<i>A. weddellii</i>	0	0	0	0	2	0	0	1	0	0	0	0
<i>A. auricapillus</i>	0	1	0	0	2	0	0	1	1	0	2	0
<i>A. jandaya</i>	1	1	[0 1]	0	2	0	0	1	1	0	2	0
<i>A. solstitialis</i>	1	1	0	0	2	0	0	1	1	0	2	0
<i>E. astec</i>	0	1	0	0	1	1	0	1	0	0	1	0
<i>E. pertinax</i>	1	1	0	0	2	0	0	1	1	1	1	0
<i>E. nana</i>	1	1	0	0	1	1	0	1	0	0	0	0
<i>E. canicularis</i>	1	1	0	0	2	0	0	1	1	0	2	0
<i>E. aurea</i>	1	1	0	0	2	0	0	1	1	0	2	0
<i>C. spixii</i>	1	0	1	0	2	0	0	1	2	0	2	0
<i>L. branickii</i>	1	1	0	0	2	0	0	1	0	1	2	0
<i>O. icterotis</i>	0	1	0	0	2	0	0	1	0	1	2	0
<i>O. manilata</i>	0	1	0	0	2	0	0	1	3	0	2	0
<i>P. maracana</i>	1	1	1	0	2	0	0	0	0	0	2	1
<i>P. frontalis</i>	0	0	1	0	2	0	0	1	0	0	2	0
<i>T. haemorrhous</i>	1	1	0	?	0	1	0	0	0	1	0	0
<i>P. frontatus</i>	1	1	1	0	0	1	0	0	0	1	0	1
<i>P. rubitorquis</i>	0	1	?	0	0	1	0	0	0	0	0	0
<i>E. surinama</i>	1	1	?	0	2	0	0	1	0	1	2	0
<i>E. aeruginosa</i>	1	?	?	?	2	0	0	1	0	[0 2]	2	0
<i>E. margaritensis</i>	0	1	0	0	2	0	0	1	0	0	2	0
<i>E. ocularis</i>	1	1	0	0	2	0	0	1	0	2	0	0
<i>E. chrysophrys</i>	1	1	0	0	2	0	0	1	0	0	2	0
<i>E. cactorum</i>	?	?	?	?	1	1	0	1	0	0	0	0
<i>E. tortugensis</i>	?	?	?	?	2	0	0	1	1	0	2	0
<i>E. arubensis</i>	?	?	?	?	2	0	0	1	1	0	2	0
<i>E. paraensis</i>	?	?	?	?	2	0	0	1	1	2	0	0
<i>E. xanthogenia</i>	?	?	?	?	2	0	0	1	1	1	[0 1]	0
<i>P. mitratus</i>	?	?	?	?	0	1	0	0	0	0	2	1
<i>A. maculata</i>	?	?	?	?	2	0	0	1	1	0	2	0
<i>P. maugei</i>	?	?	?	?	0	1	0	0	0	0	0	0
<i>P. alticolus</i>	?	?	?	?	0	1	0	0	0	1	2	1

Taxon	Char49	Char50	Char51	Char52	Char53	Char54	Char55	Char56	Char57	Char58	Char59	Char60
<i>A. ararauna</i>	0	0	2	0	2	-	0	1	-	0	3	-
<i>D. nobilis</i>	3	3	0	0	0	0	0	0	0	0	0	0
<i>G. guarouba</i>	1	4	1	0	1	1	0	1	1	0	1	1
<i>C. carolinensis</i>	1	4	1	0	1	1	0	1	1	0	1	1
<i>T. acuticaudatus</i>	3	3	3	0	3	3	0	2	3	0	2	2
<i>P. wagleri</i>	1	1	0	0	0	0	0	0	0	1	0	0
<i>P. holochlorus</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>P. finschi</i>	5	2	0	0	0	0	1	0	0	1	0	0
<i>P. brevipes</i>	0	0	0	0	0	0	0	1	0	0	0	0
<i>P. chlorogenys</i>	5	2	0	0	0	0	1	0	0	1	0	0
<i>P. leucophthalmus</i>	0	0	0	0	0	0	1	0	0	1	0	0
<i>P. euops</i>	5	2	0	1	0	0	1	0	0	1	0	0
<i>P. erythrogyens</i>	1	1	4	0	1	2	0	0	2	0	0	0
<i>P. chloropterus</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>A. nenday</i>	6	7	-	0	2	5	[0 1]	3	5	0	3	5
<i>A. weddellii</i>	3	3	2	0	3	3	0	2	3	0	3	2
<i>A. auricapillus</i>	1	4	0	0	0	0	0	0	0	0	0	0
<i>A. jandaya</i>	1	4	1	0	1	1	0	1	1	0	1	1
<i>A. solstitialis</i>	1	4	1	0	1	1	0	1	1	0	1	1
<i>E. astec</i>	0	0	0	0	0	0	0	0	0	0	3	3
<i>E. pertinax</i>	4	6	0	0	1	1	0	1	1	0	1	1
<i>E. nana</i>	0	0	0	0	0	0	0	0	0	0	3	3
<i>E. canicularis</i>	4	5	0	0	2	6	0	4	4	0	3	3
<i>E. aurea</i>	4	5	0	0	2	6	0	4	4	0	3	3
<i>C. spixii</i>	3	3	0	0	3	3	0	2	3	0	2	2
<i>L. branickii</i>	0	0	0	0	0	0	0	1	1	0	0	0
<i>O. icterotis</i>	0	0	0	0	1	1	0	1	1	0	0	0
<i>O. manilata</i>	3	3	0	0	5	-	0	1	1	0	0	0
<i>P. maracana</i>	3	3	3	0	3	3	0	2	3	0	2	2
<i>P. frontalis</i>	0	0	0	0	6	-	0	0	0	0	5	-
<i>T. haemorrhous</i>	3	3	0	0	0	0	0	0	0	0	0	0
<i>P. frontatus</i>	1	1	0	0	0	0	0	0	0	0	0	0
<i>P. rubritorquis</i>	0	0	0	1	0	0	1	0	0	0	1	6
<i>E. surinama</i>	3	3	0	0	1	1	0	4	[1 4]	0	4	[1 4]
<i>E. aeruginosa</i>	3	3	0	0	2	4	0	3	4	0	3	3
<i>E. margaritensis</i>	3	3	0	0	2	4	0	3	4	0	3	3
<i>E. ocularis</i>	3	3	0	0	2	4	0	3	4	0	3	3
<i>E. chrysophrys</i>	3	3	0	0	2	4	0	3	4	0	3	3
<i>E. cactorum</i>	3	3	0	0	2	4	0	0	0	0	3	3
<i>E. tortugensis</i>	3	3	0	0	4	[1 4]	0	4	[1 4]	0	4	[1 4]
<i>E. arubensis</i>	3	3	0	0	4	[1 4]	0	4	[1 4]	0	3	3
<i>E. paraensis</i>	3	3	0	0	2	4	0	3	4	0	3	3
<i>E. xanthogenia</i>	[1 5]	[4 6]	[0 1]	0	1	1	0	1	1	0	1	1
<i>P. mitratus</i>	5	2	0	0	1	2	0	0	0	1	0	0
<i>A. maculata</i>	1	4	1	0	1	1	0	1	1	0	1	1
<i>P. maugei</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>P. alticolus</i>	0	0	0	0	0	0	1	0	0	0	0	0

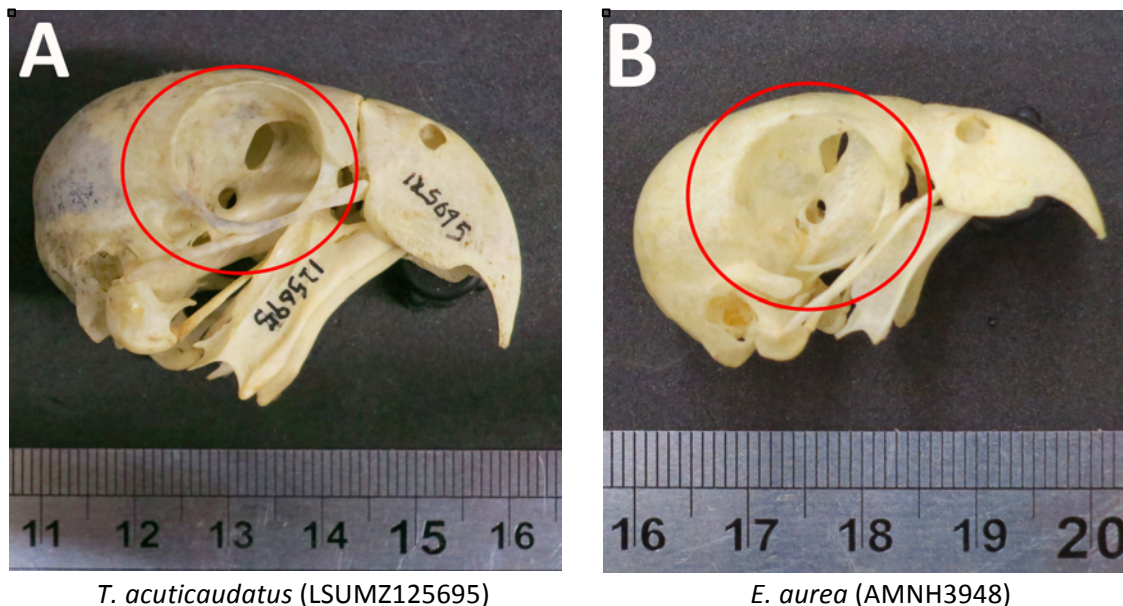
Taxon	Char61	Char62	Char63	Char64	Char65	Char66	Char67	Char68	Char69	Char70	Char71	Char72
<i>A. ararauna</i>	0	5	-	0	2	0	3	-	2	2	2	1
<i>D. nobilis</i>	0	0	0	0	0	0	0	-	-	0	1	0
<i>G. guarouba</i>	0	1	1	0	1	0	1	2	2	3	3	2
<i>C. carolinensis</i>	0	1	1	0	0	0	0	3	1	3	0	0
<i>T. acuticaudatus</i>	0	0	0	0	0	0	0	1	1	0	0	0
<i>P. wagleri</i>	1	0	0	0	0	0	0	0	0	0	0	0
<i>P. holochlorus</i>	1	0	0	1	0	0	0	0	0	0	0	0
<i>P. finschi</i>	1	0	0	1	0	0	0	4	2	4	1	0
<i>P. brevipes</i>	0	0	0	0	0	0	0	0	0	0	0	0
<i>P. chlorogenys</i>	1	0	0	0	0	1	0	0	0	0	0	0
<i>P. leucophthalmus</i>	1	0	0	1	0	1	0	4	2	5	0	0
<i>P. euops</i>	1	0	0	1	0	0	0	4	0	4	1	0
<i>P. erythrogenys</i>	1	0	0	0	0	0	0	4	0	4	1	0
<i>P. chloropterus</i>	0	0	0	0	0	0	0	4	4	4	1	0
<i>A. nenday</i>	[0 1]	2	5	0	0	0	0	1	1	1	0	0
<i>A. weddellii</i>	0	3	2	0	0	0	0	1	1	2	0	0
<i>A. auricapillus</i>	0	0	0	0	0	0	0	3	3	1	0	0
<i>A. jandaya</i>	0	1	1	0	0	0	0	3	3	2	0	0
<i>A. solstitialis</i>	0	1	1	0	1	0	1	2	2	3	3	2
<i>E. astec</i>	0	3	3	0	0	0	0	0	0	1	0	0
<i>E. pertinax</i>	0	1	1	0	0	0	0	0	0	1	0	0
<i>E. nana</i>	0	3	3	0	0	0	0	0	0	1	0	0
<i>E. canicularis</i>	0	3	3	0	0	0	0	0	0	1	0	0
<i>E. aurea</i>	0	3	3	0	0	0	0	0	0	1	0	0
<i>C. spixii</i>	0	2	2	0	2	0	3	-	-	2	2	1
<i>L. branickii</i>	0	0	0	0	0	0	0	1	1	2	0	0
<i>O. icterotis</i>	0	0	0	0	0	0	0	0	1	1	0	0
<i>O. manilata</i>	0	0	0	0	0	0	0	1	1	2	0	0
<i>P. maracana</i>	0	0	0	0	0	0	0	-	-	2	0	0
<i>P. frontalis</i>	0	4	-	0	0	0	4	1	1	0	0	0
<i>T. haemorrhous</i>	0	0	0	0	0	0	0	1	1	0	0	0
<i>P. frontatus</i>	0	0	0	0	0	0	0	4	0	4	1	0
<i>P. rubritorquis</i>	0	1	6	0	0	0	0	0	0	0	0	0
<i>E. surinama</i>	0	4	[1 4]	0	0	0	0	0	0	1	0	0
<i>E. aeruginosa</i>	0	3	3	0	0	0	0	0	0	1	0	0
<i>E. margaritensis</i>	0	3	3	0	0	0	0	0	0	1	0	0
<i>E. ocularis</i>	0	3	3	0	0	0	0	0	0	1	0	0
<i>E. chrysophrys</i>	0	3	3	0	0	0	0	0	0	1	0	0
<i>E. cactorum</i>	0	3	3	0	0	0	0	0	0	1	0	0
<i>E. tortugensis</i>	0	4	[1 4]	0	0	0	0	0	0	1	0	0
<i>E. arubensis</i>	0	3	3	0	0	0	0	0	0	1	0	0
<i>E. paraensis</i>	0	3	3	0	0	0	0	0	0	1	0	0
<i>E. xanthogenia</i>	0	1	1	0	0	0	0	0	0	1	0	0
<i>P. mitratus</i>	1	0	0	1	0	1	0	0	0	0	0	0
<i>A. maculata</i>	0	1	1	0	1	0	2	3	3	0	4	3
<i>P. maugei</i>	0	0	0	0	0	0	0	5	4	4	0	0
<i>P. alticolus</i>	0	0	0	0	0	0	0	0	0	0	0	0

Taxon	Char73	Char74	Char75	Char76	Char77	Char78	Char79	Char80	Char81	Char82	Char83	Char84	Char85
<i>A. ararauna</i>	1	3	1	3	4	5	5	5	4	4	3	4	3
<i>D. nobilis</i>	0	2	0	0	0	0	0	[0 1]	1	1	0	-	3
<i>G. guarouba</i>	0	-	3	4	1	5	5	5	0	0	0	-	-
<i>C. carolinensis</i>	0	0	0	-	0	0	0	0	5	5	0	1	3
<i>T. acuticaudatus</i>	0	2	0	0	0	4	4	0	1	1	0	1	2
<i>P. wagleri</i>	0	0	0	0	0	0	0	0	0	0	0	0	1
<i>P. holochlorus</i>	0	0	0	0	0	0	0	0	0	0	0	0	1
<i>P. finschi</i>	0	0	0	0	0	0	0	0	0	0	0	0	1
<i>P. brevipes</i>	0	0	0	0	0	0	0	0	0	0	0	0	1
<i>P. chlorogenys</i>	0	0	0	0	0	0	0	2	0	0	0	0	1
<i>P. leucophthalmus</i>	0	0	0	0	0	0	0	2	0	0	0	0	1
<i>P. euops</i>	0	0	0	0	0	1	1	2	0	0	0	0	1
<i>P. erythrogyens</i>	0	0	0	0	0	0	0	2	0	0	0	0	1
<i>P. chloropterus</i>	0	0	0	0	0	0	0	0	0	0	0	0	1
<i>A. nenday</i>	0	3	0	0	0	0	0	3	2	2	1	2	0
<i>A. weddellii</i>	2	4	0	0	0	0	0	0	2	2	1	2	0
<i>A. auricapillus</i>	0	4	0	0	2	1	1	0	2	2	1	2	0
<i>A. jandaya</i>	0	4	0	0	2	3	3	4	2	2	1	2	0
<i>A. solstitialis</i>	0	4	0	1	1	3	3	3	2	6	1	2	0
<i>E. astec</i>	0	3	0	0	0	0	0	0	3	3	1	3	1
<i>E. pertinax</i>	0	1	0	0	0	2	2	1	3	3	1	3	1
<i>E. nana</i>	0	3	0	0	0	0	0	0	3	3	1	3	1
<i>E. canicularis</i>	0	3	0	0	0	0	0	1	3	3	1	3	1
<i>E. aurea</i>	0	3	0	0	0	0	0	1	3	3	1	3	1
<i>C. spixii</i>	1	-	1	3	4	-	-	-	4	4	2	4	-
<i>L. branickii</i>	0	0	0	0	0	2	2	0	1	1	0	0	4
<i>O. icterotis</i>	0	0	0	0	0	5	5	0	0	0	0	0	4
<i>O. manilata</i>	0	2	2	0	0	1	1	[0 1]	1	1	0	0	3
<i>P. maracana</i>	0	2	2	0	0	1	1	[0 1]	1	1	0	-	3
<i>P. frontalis</i>	0	0	0	4	0	1	1	0	0	0	1	-	4
<i>T. haemorrhous</i>	0	0	0	0	0	0	0	0	1	1	0	1	2
<i>P. frontatus</i>	0	0	0	0	0	0	0	2	0	0	0	0	1
<i>P. rubritorquis</i>	0	0	0	0	0	0	0	0	0	0	0	0	1
<i>E. surinama</i>	0	1	0	0	0	2	2	1	3	3	1	3	1
<i>E. aeruginosa</i>	0	1	0	0	0	2	2	1	3	3	1	3	1
<i>E. margaritensis</i>	0	1	0	0	0	2	2	1	3	3	1	3	1
<i>E. ocularis</i>	0	1	0	0	0	2	2	1	3	3	1	3	1
<i>E. chrysophrys</i>	0	1	0	0	0	2	2	1	3	3	1	3	1
<i>E. cactorum</i>	0	1	0	0	0	3	3	1	3	3	1	3	1
<i>E. tortugensis</i>	0	1	0	0	0	2	2	1	3	3	1	3	1
<i>E. arubensis</i>	0	1	0	0	0	2	2	1	3	3	1	3	1
<i>E. paraensis</i>	0	1	0	0	0	2	2	1	3	3	1	3	1
<i>E. xanthogenia</i>	0	1	0	0	0	2	2	1	3	3	1	3	1
<i>P. mitratus</i>	0	0	0	0	0	1	1	2	0	0	0	0	1
<i>A. maculata</i>	0	4	0	1	3	3	3	4	2	6	1	2	0
<i>P. maugei</i>	0	0	0	0	0	0	0	0	0	0	0	0	1
<i>P. alticolus</i>	0	0	0	0	0	0	0	2	0	0	0	0	?

Appendix 5. Description and codification of the 85 characters used to infer the phylogeny of *Aratinga* sensu Peters (1937).

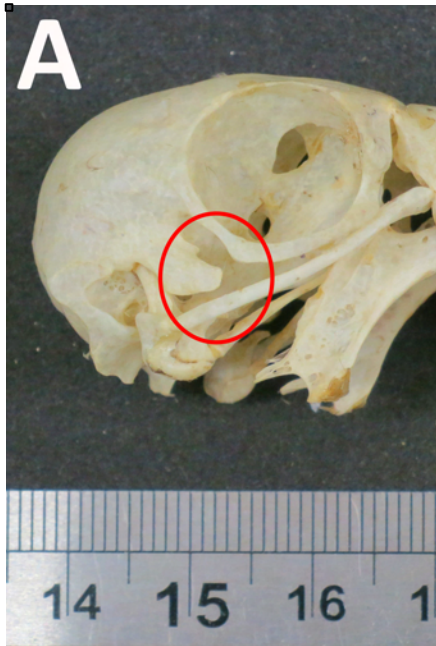
5.1 Osteological characters

- 1) *Skeleton axiale, ossa cranii*, orbit format (lateral view): complete (0) or incomplete (1).
Character 1 in the datasets.

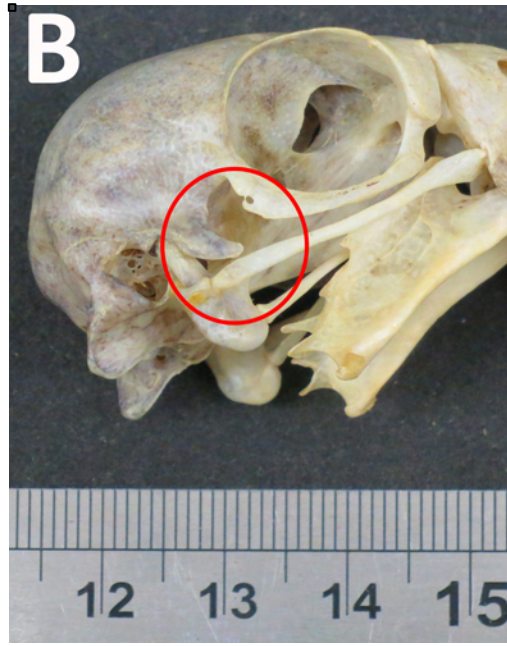


Character already proposed by some authors (Tokita 2003; Machado *et al.* 2006; Alvarenga 2007; Tokita *et al.* 2007) to differentiate taxa belonging to the order Psittaciformes. Most modern birds present an open orbit, whereas fossil reptilian birds exhibit a closed orbit (Prince 1956). Nevertheless, in most psittaciforms, anseriforms and some scolopacids (Baumel *et al.* 1993) the prefrontal bone is attached to the frontal bone, forming the suborbital arch that completes the orbit rostroventrally (Figure A). This cranial morphology is thought to be a secondary structure derived from the ossification of the subocular ligament and serves in cracking hard and/or large nuts (Tokita 2003). On the other hand, other psittacines exhibit an orbit that is ventrally incomplete and lack the suborbital arch (Figure B). According to Tokita *et al.* (2007) the suborbital arch would appear in some parrot species around the ontogenetic phase when birds leave the nest, as a consequence of heterochronic elongation of osteogenesis. Also, the presence of this feature does not seem to be related to the type of diet. For instance, Australasian cockatoos (Cacatuidae) vary according to their diet, irrespective of their shared cranial morphology. Similarly, this character widely varies within the genus *Aratinga* sensu Peters (1937). However, all representants of the genus *Psittacara* Vigors, 1825 present an enclosed orbit. Moreover, our study confirmed that among the taxa here selected as outgroups, *O. manilata*, *A. ararauna*, *G. guarouba* and *D. nobilis* exhibit a closed orbit, as suggested by Machado *et al.* (2006); whereas *C. spixii* presents an open orbit as proposed by Alvarenga (2007).

2) *Skeleton axiale, ossa cranii, proc. zygomaticus*, length (lateral view): short (0) or medium (1).
Character 2 in the datasets.



A. jandaya (FMNH360309)



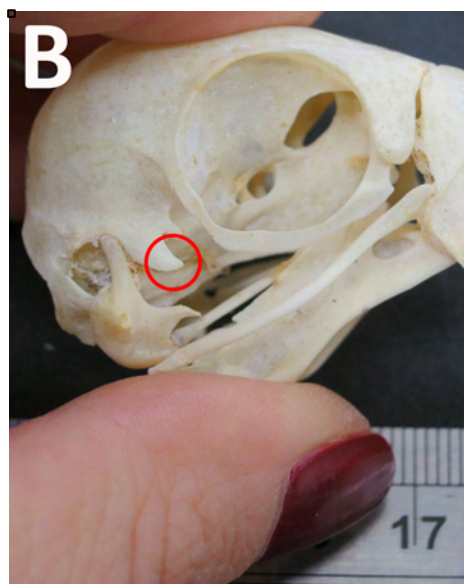
P. leucophthalmus (FMNH320428)

The *processus zygomaticus* is situated ventral to the *processus postorbitalis*. Particularly, in parrots the tips of the *proc. postorbitalis* and *proc. zygomaticus* are joined (Baumel *et al.* 1993). As already pointed out by Gaban-Lima (2007), within the psittacines the *proc. zygomaticus* can present different length in relation to the other structures of the skull. Examined specimens present a short *proc. zygomaticus*, when it terminates before the caudal edge of the orbit (Figure A) or a medium *proc. zygomaticus*, when it almost reaches the *arcus jugalis* (Figure B). All taxa belonging to the genus *Thectocercus* present a short *proc. zygomaticus*.

3) *Skeleton axiale, ossa cranii, proc. zygomaticus* shape (lateral view): rounded (0) or pointed (1).
Character 7 in the datasets.



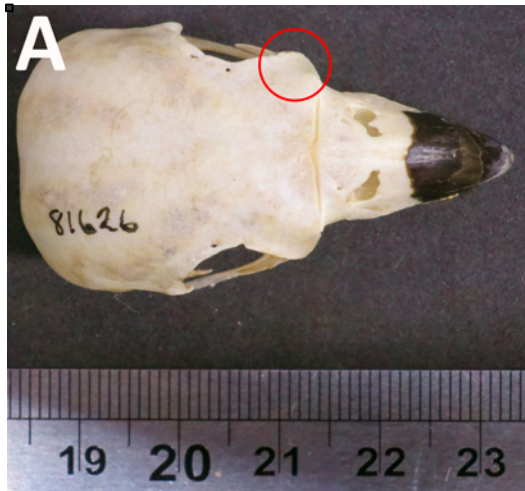
A. solstitialis (FMNH360310)



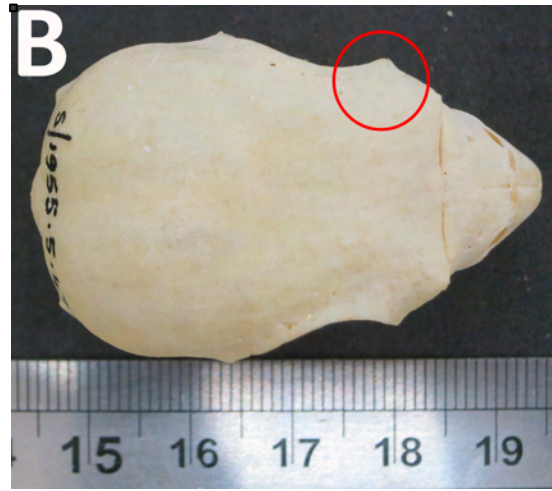
T. acuticaudatus (BMNHs1955.5.47)

Besides length, the *proc. zygomaticus* also varies in shape within the analyzed taxa. In fact, it can be pointed, when more or less elongated but presenting pointed tip (Figure A) or rounded, when presenting rotund tip (Figure B). This character seems to support the genus *Eupsittula*, since all examined species present rounded *proc. zygomaticus*, with the exception of *E. aeruginosa*, whose skull was unavailable.

4) *Skeleton axiale, ossa cranii, proc. lacrimalis* shape (dorsal view): rounded (0) or pointed (1).
Character 3 in the datasets.



A. nenday (LSUMZ81626)



T. acuticaudatus (BMNHs/1955.5.47)

The *processus lacrimalis* is a lateral flared projection of the lateral margin of the frontal bone immediately caudal to its articulation with *os lacrimale* (Baumel *et al.* 1993). It is present in the genera *Larus*, *Morus*, *Cathartes* (Baumel *et al.* 1993; Brito 2008). In the examined skeletons we found that the *proc. lacrimalis* can be rounded (Figure A) or pointed (Figure B). Particularly, species of *Thectocercus* are characterized by a pointed *proc. lacrimalis*, whereas all examined specimens of *Eupsittula* present a rounded *proc. lacrimalis*.

5) *Skeleton axiale, ossa cranii, fossa temporalis, ridge* (lateral view): present (1) or absent (0).
Character 5 in the datasets.



P. leucophthalmus (FMNH290913)



A. solstitialis (AMNH13706)

Some of the analyzed specimens present a ridge on the *fossa temporalis*, that is an excavation on the lateral aspect of the cranium caudal to the postorbital process (Baumel *et al.* 1993) and can be more or less etched in parrots. This ridge is present in *P. wagleri*, *P. leucophthalmus* and *P. maracana*.

6) *Skeleton axiale, ossa cranii*, deep *fossa temporalis* (lateral view): present (1) or absent (0). Character 6 in the datasets.



A. *weddellii* (USNM345863)



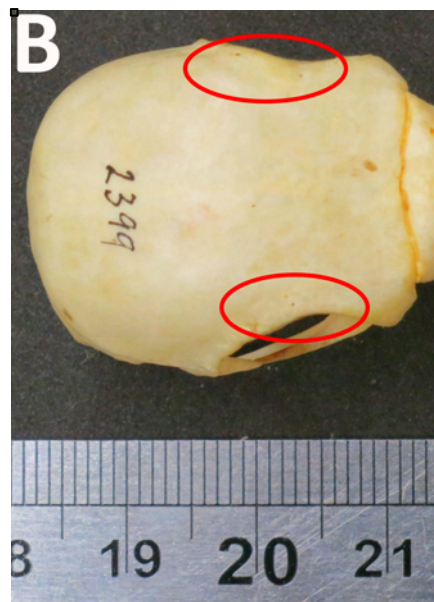
E. *canicularis* (AMNH8317)

As above mentioned, some parrots present an etched *fossa temporalis* (Figure A), as in the case of taxa belonging to *Thectocercus*, whereas other species exhibit a shallow *fossa temporalis* (Figure B).

7) *Skeleton axiale, ossa cranii*, supraorbital region, marked foramina (dorsal view): present (1) or absent (0). Character 20 in the datasets.



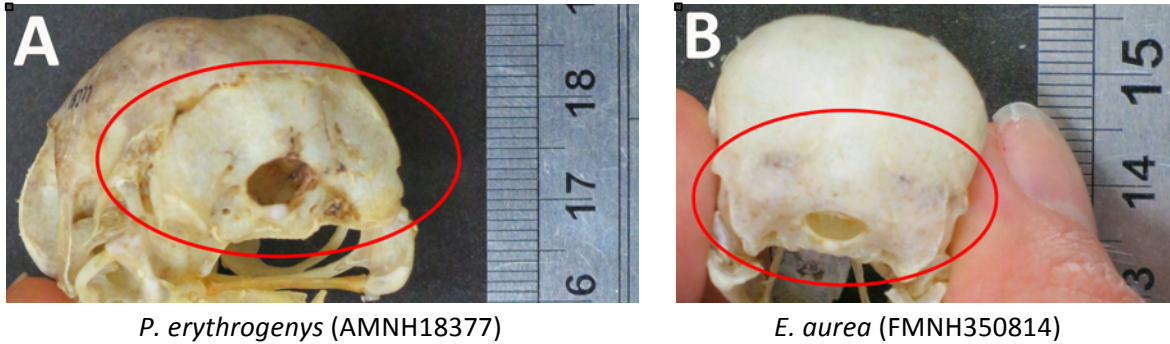
P. *leucophthalmus* (AMNH6671)



A. *jandaya* (AMNH2399)

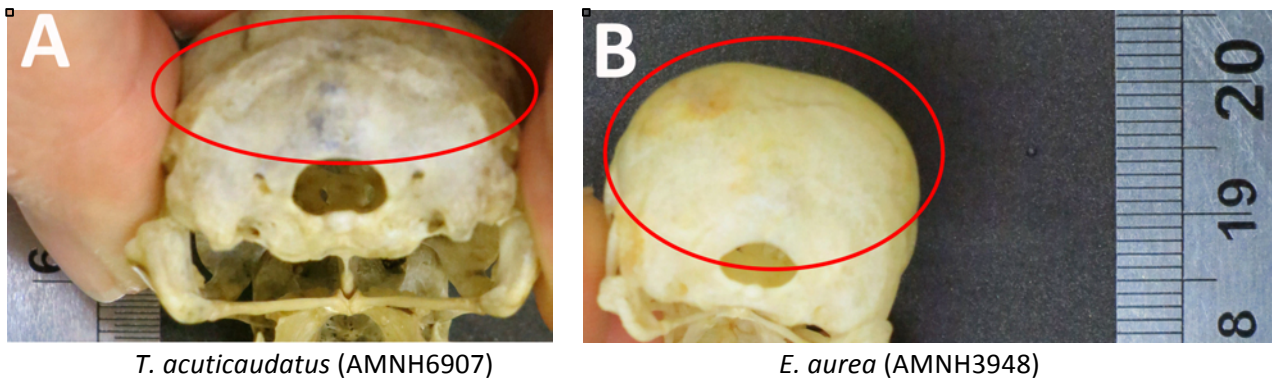
The majority of examined species present several foramina in the supraorbital region (Figure A). Particularly, representatives of the genera *Thectocercus* and *Psittacara* all exhibit marked foramina.

8) *Skeleton axiale, Ossa cranii*, marked *crista nuchalis transversa* (dorsal view): present (1) or absent (0). Character 12 in the datasets.



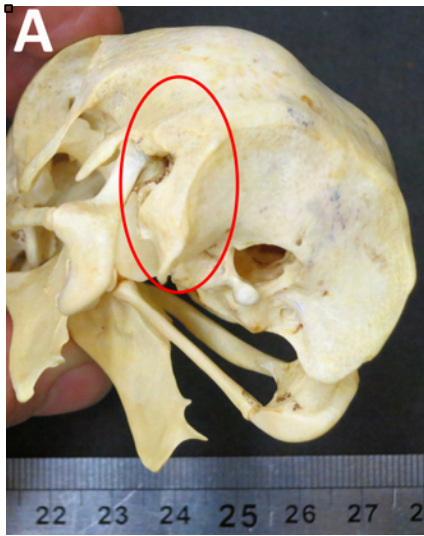
The *crista nuchalis transversa* is an arched and usually distinct crest separating the nuchal plane of the supraoccipital bone from the parietal and squamosal bones (Baumel *et al.* 1993). Within the examined specimens, all *Thectocercus* present a marked *crista nuchalis transversa* (Figure A), while in other species the crista is more shallow (Figure B).

9) *Skeleton axiale, ossa cranii, crista nuchalis transversa* shape (dorsal view): M (0) or reverse U (1). Character 13 in the datasets.



The *crista nuchalis transversa* can present two different shapes in parrots, as observed by Brito (2008) in Cathartidae. It can exhibit the shape of a “M” (Figure A) or it can look more like a reverse “U” (Figure B). All examined specimens of *Thectocercus* present a *crista nuchalis transversa* with a “M” shape, whereas all *Eupsittula* exhibit a reverse “U” shape.

10) *Skeleton axiale, ossa cranii, crista nuchalis transversa* reaching the *proc. paraoccipitalis* (dorsal view): present (1) or absent (0). Character 11 in the datasets.



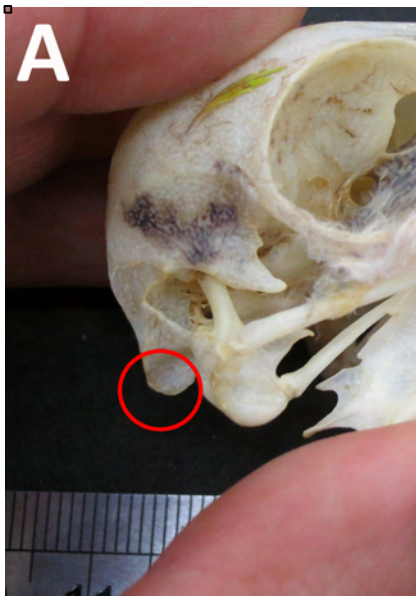
A. ararauna (AMNH16514)



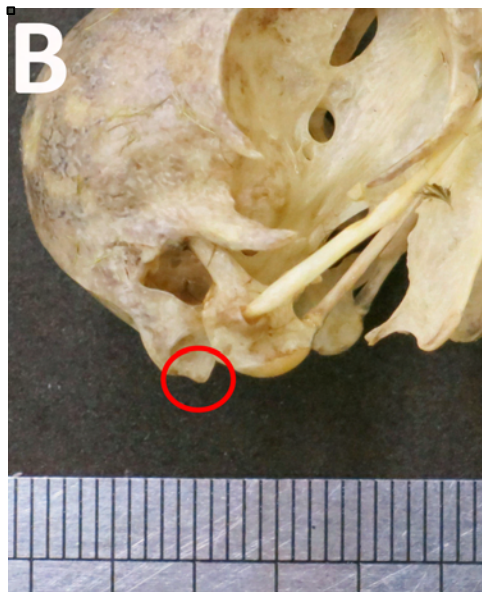
P. frontalis (AMNH2315)

The *crista nuchalis transversa* may extend caudolaterally to reach the *proc. paraoccipitalis* (Figure A) as in the genus *Thectocercus* or extend to reach the *lamina parasphenoidalis* (Figure B).

11) *Skeleton axiale, ossa cranii, proc. paraoccipitalis* shape (lateral view): rounded (0) or pointed (1). Character 25 in the datasets.



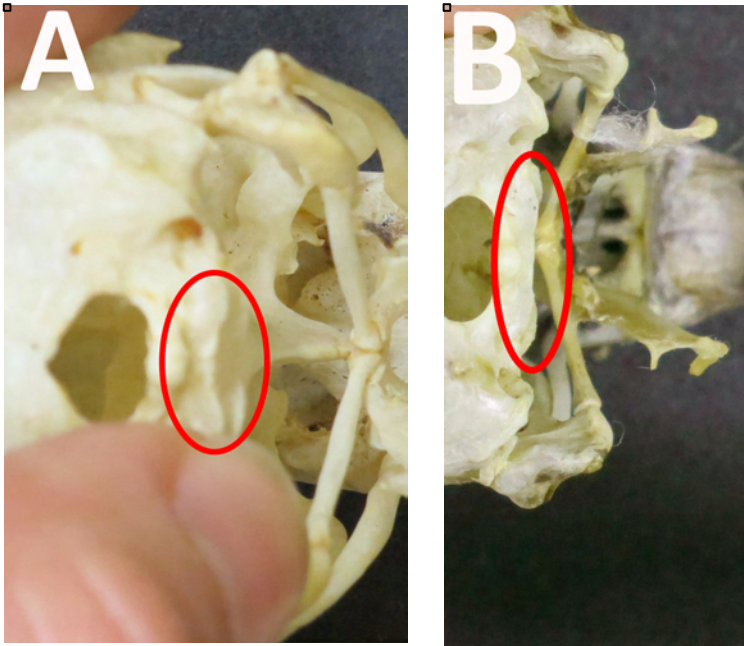
P. erythrogegens (BMNHs/1997.48.2)



A. nenday (AMNH16514)

The *proc. paraoccipitalis* forms the caudal wall of *Cavum tympanicum* and *Meatus acusticus* and provides attachment for *Lig. occipitomandibularis* and *M. depressor mandibulae* (Baumel *et al.* 1993). In the examined species it can be rounded (Figure A) as in *Thectocercus* or terminate with a pointed tip (Figure B).

12) *Skeleton axiale, ossa cranii, ala parasphenoidalis, ridge (caudal view): present (1) or absent (0).* Character 14 in the datasets.

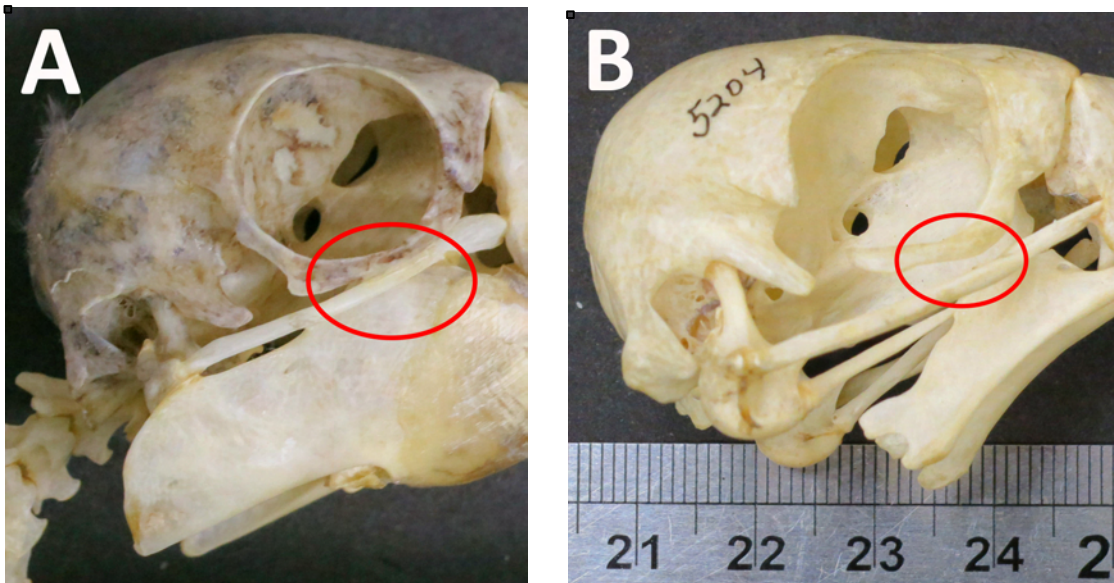


C. spixii (AMNH5204)

E. margaritensis (LSUMZ68993)

The *ala parasphenoidalis* in some of the analyzed species presents a ridge visible in caudal view (Figure A) whereas in others is smooth (Figure B). This ridge is present in *Thectocercus*, 1916; while it is absent in *Aratinga* and *Eupsittula*.

13) *Skeleton axiale, facies, maxilla, arcus suborbitalis touching the arcus jugalis (lateral view): present (1) or absent (0).* Character 10 in the datasets.

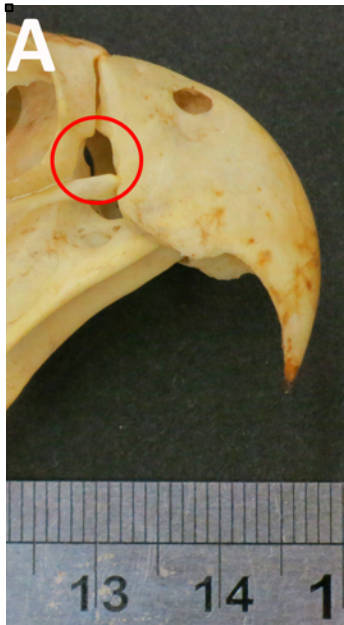


P. frontatus (LSUMZ114313)

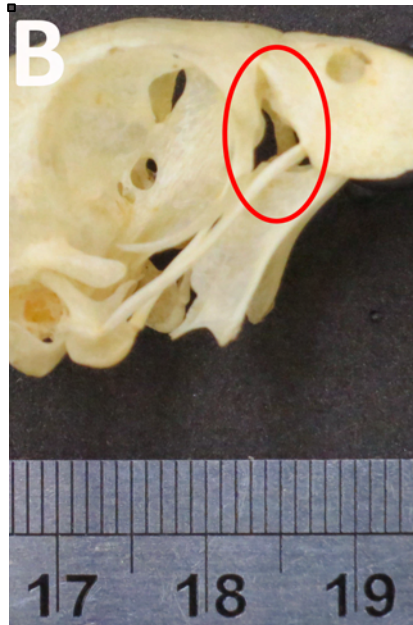
C. spixii (AMNH5204)

In some parrots the prefrontal bone is attached to the frontal bone forming the *arcus suborbitalis*, that in some species almost touches the *arcus jugalis* (Figure A), whereas in others such as in the genus *Thectocercus* exists a space between the two structures (Figure B).

14) *Skeleton axiale, facies, maxilla, fenestra antorbitalis* shape (lateral view): rounded (0) or triangular (1). Character 19 in the datasets.



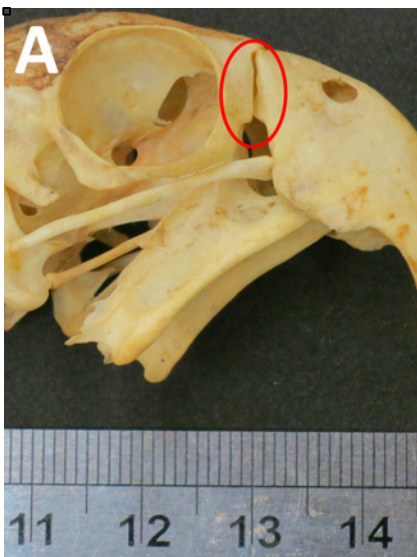
E. astec (AMNH12645)



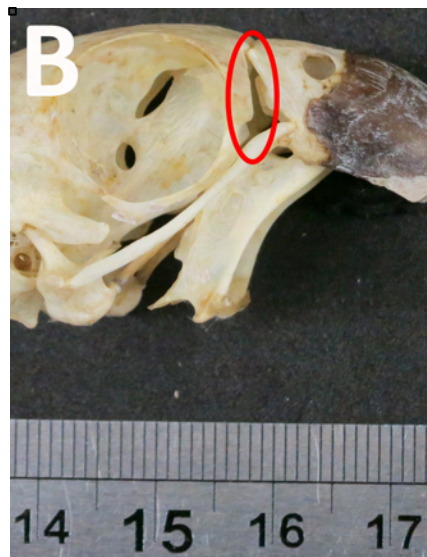
E. aurea (AMNH3948)

When the skull is viewed from the side, the *fenestra antorbitalis* is a pronounced gap bounded by the nasal process of the maxillary bone, the maxillary process of the nasal bone, the jugal and lacrimal bones (Baumel *et al.* 1993). In parrots, the fenestra can be more round shaped, as in *Thectocercus* (Figure A) or triangular (Figure B).

15) *Skeleton axiale, facies, maxilla, lacrimal almost closing the fenestra antorbitalis* (lateral view): present (1) or absent (0). Character 23 in the datasets.



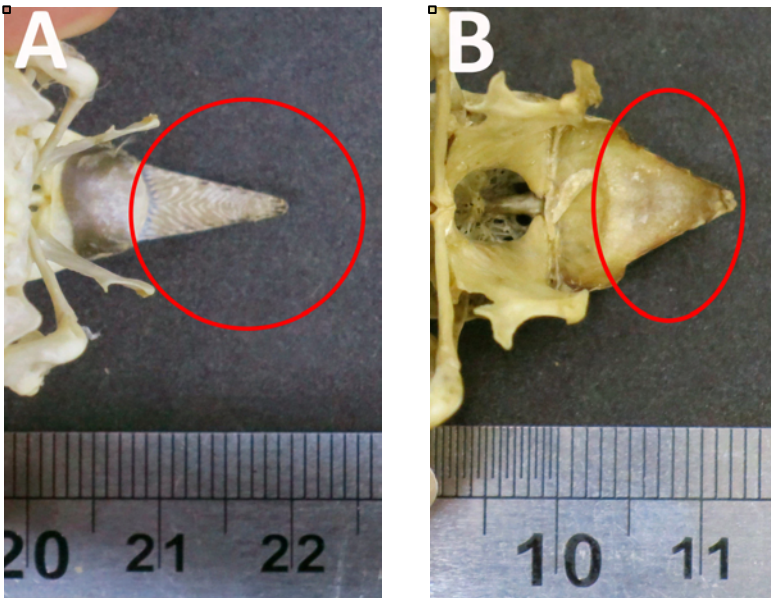
E. astec (AMNH12645)



A. solstitialis (FMNH360310)

In some species the lacrimal reduces the gap formed by the *fenestra antorbitalis* almost closing it (Figure A), whereas in others the fenestra is larger (Figure B).

16) *Skeleton axiale, facies, maxilla, rostrum maxillae* shape (ventral view): isosceles triangle (0) or equilateral triangle (1). Character 8 in the datasets.

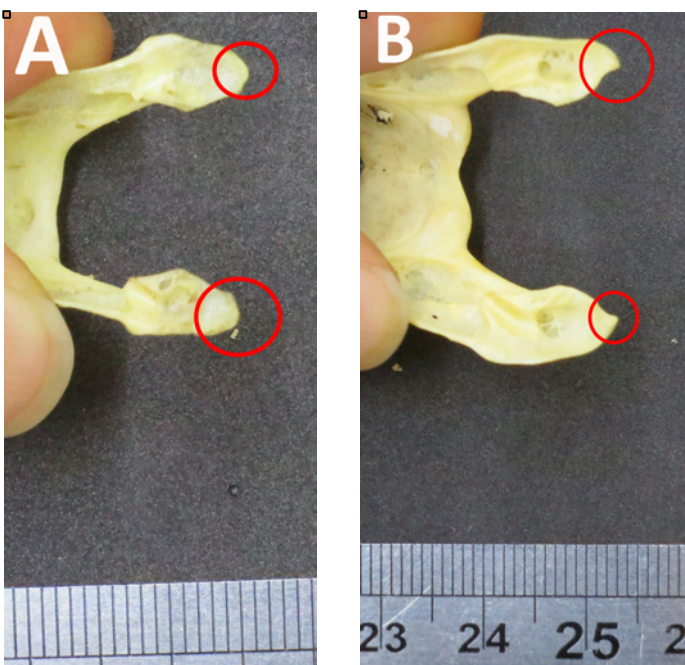


A. nenday (LSUMZ81626)

T. acuticaudatus (AMNH6907)

The *rostrum maxillae* is the pointed, apical region of the upper jaw that when viewed in ventral view can present the shape of an isosceles triangle (Figure A) as in *Aratinga* or of an equilateral triangle (Figure B) as in the genera *Thectocercus* and *Psittacara*.

17) *Skeleton axiale, facies, mandibula, proc. retroarticularis* shape (ventral view): triangular obtuse (0) or triangular acute (1). Character 18 in the datasets.

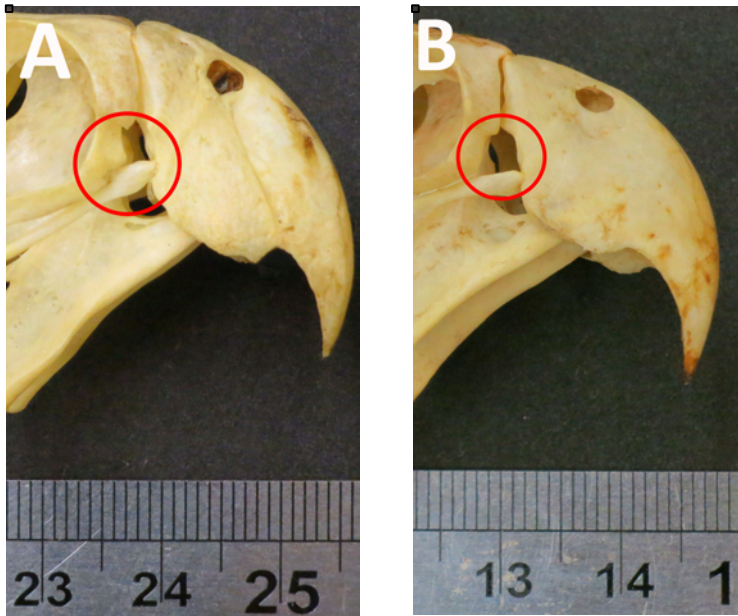


E. aurea (AMNH3948)

P. leucophthalmus (AMNH6671)

The *proc. retroarticularis* projects caudally past the articular fossa of the mandible and it is prominent in psittaciforms (Baumel *et al.* 1993). It can exhibit the shape of an acute triangle (Figure B) as in *Thectocercus* and *Psittacara* or of an obtuse triangle (Figure B) as in *Aratinga*.

18) *Skeleton axiale, ossa faciei, ossa maxillae et palati*, median portion of the *proc. orbitalis* of the lacrimal, indent (lateral view): present (1) or absent (0). Character 4 in the datasets.

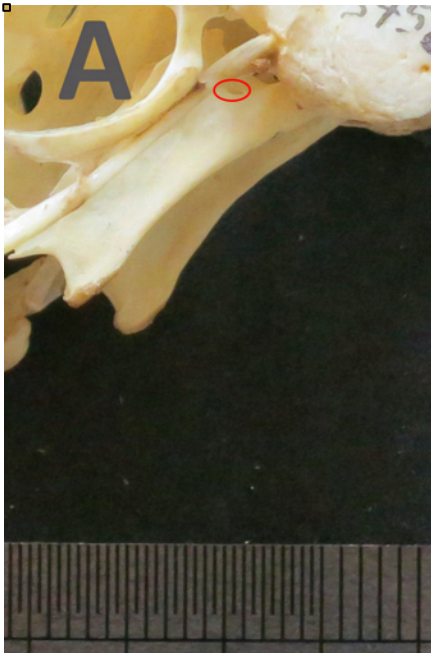


P. leucophthalmus (AMNH6671)

E. astec (AMNH12645)

This character has first been used by Brito (2008), who observed that some Accipitridae present a projection on the median portion of the *proc. orbitalis* of the lacrimal. The same structure could be found in some of the examined psittaciforms. Particularly, only *P. wagleri*, *P. leucophthalmus*, *P. chloropterus* and *P. maracana* present such indent.

19) *Skeleton axiale, ossa faciei, ossa maxillae et palati, foramen pneumaticum palatini size (lateral view):* small (0) or large (1). Character 24 in the datasets.



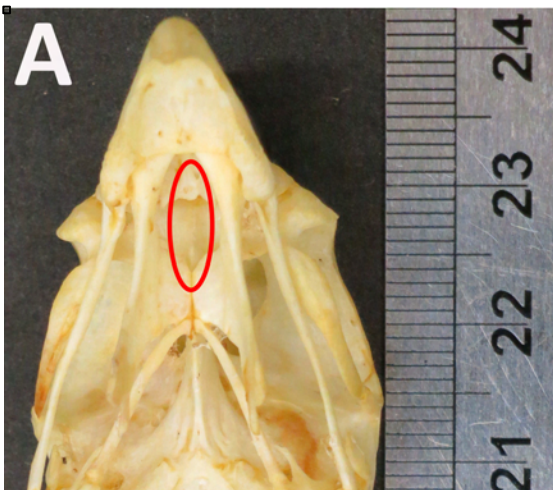
A. weddellii (USNM345863)



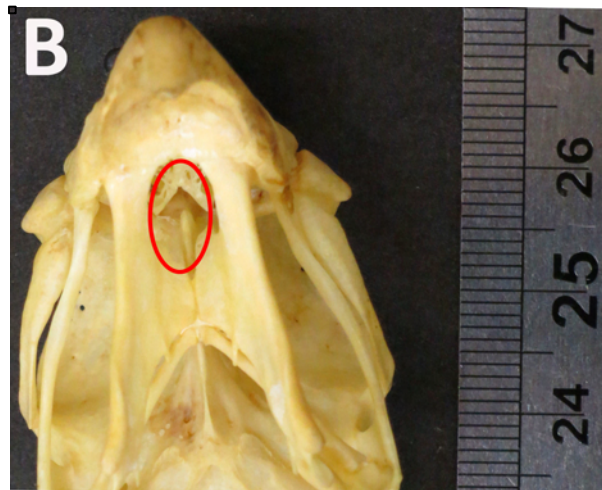
G. guarouba (USNM613781)

The *foramen pneumaticum palatini* mainly presents two sizes in the examined species, it can be small as in *Aratinga* when it constitutes less than 50% of palatine width (Figure A) or large, when it reaches 50% or more of palatine width (Figure B).

20) *Skeleton axiale, ossa faciei, ossa maxillae et palati, space between os maxillare and os palatinum (ventral view):* present (1) or absent (0). Character 9 in the datasets.



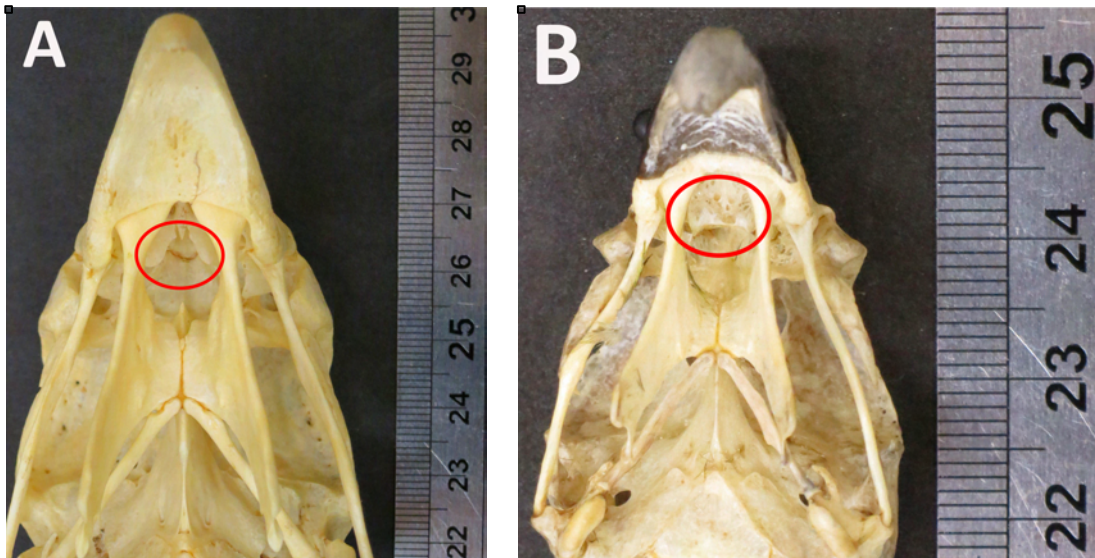
A. jandaya (AMNH2399)



P. leucophthalmus (AMNH6671)

In some specimens there exists a wide space between *os maxillare* and *os palatinum* (Figure A), whereas in others such as in the genus *Thectocercus* this space is reduced (Figure B).

21) *Skeleton axiale, ossa faciei, ossa maxillae et palati*, region of the *os maxillare*, notch (ventral view): present (1) or absent (0). Character 26 in the datasets.

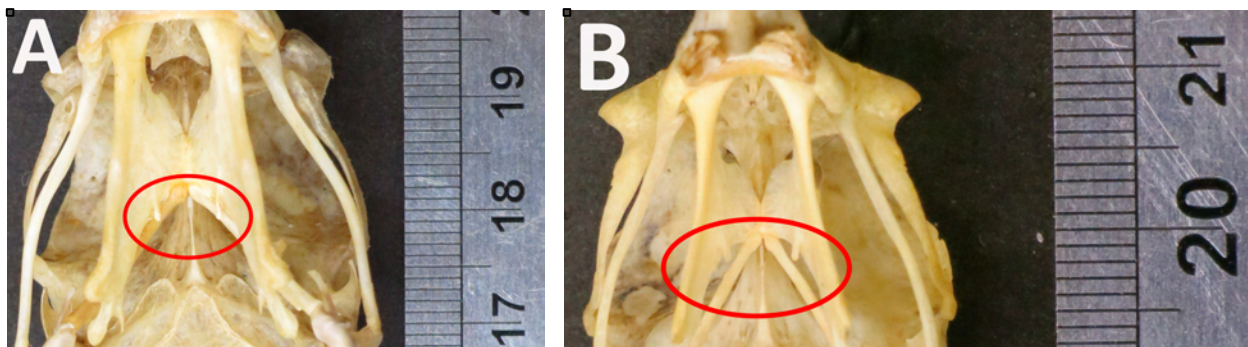


A. *ararauna* (AMNH3942)

A. *nenday* (AMNH16514)

In the region of *os maxillare* there can be a notch as in the species of the genus *Thectocercus* (Figure A) or this part appears to be fused (Figure B).

22) *Skeleton axiale, ossa faciei, ossa maxillae et palati*, contact region between the pterygoid and caudal portion of *os palatinum* (ventral view): present (1) or absent (0). Character 21 in the datasets.



P. *erythrogenys* (AMNH18377)

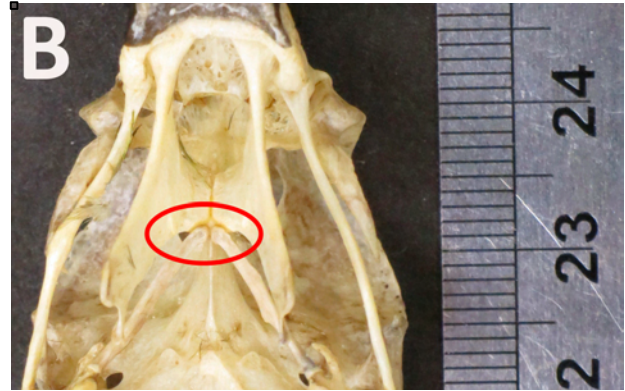
E. *canicularis* (AMNH8317)

When the skull is viewed in ventral view, there can be a contact region between the pterygoid and the caudal portion of *os palatinum* (Figure A) or there can be a space between these two structures (Figure B) as in the genus *Thectocercus*.

23) *Skeleton axiale, ossa faciei, ossa maxillae et palati*, crista of the median portion of *os palatinum* touching the pterygoid (ventral view): present (1) or absent (0). Character 22 in the datasets.



P. chloropterus (FMNH350812)



A. nenday (AMNH16514)

The crista of the median portion of *os palatinum* can touch the pterygoid as in the genera *Thectocercus* and *Psittacara* (Figure A) or do not reach the pterygoid as in *Aratinga* (Figure B).

24) *Skeleton axiale, ossa faciei, ossa mandibulae, fenestra caudalis mandibulae* (lateral view): present (1) or absent (0). Character 15 in the datasets.



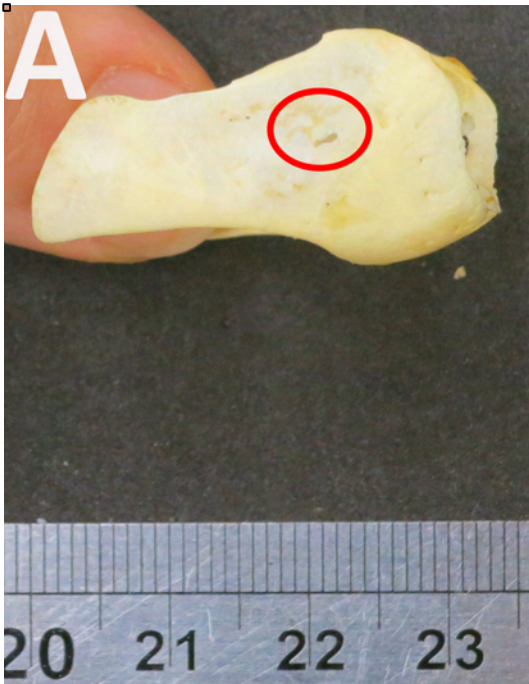
T. acuticaudatus (AMNH6907)



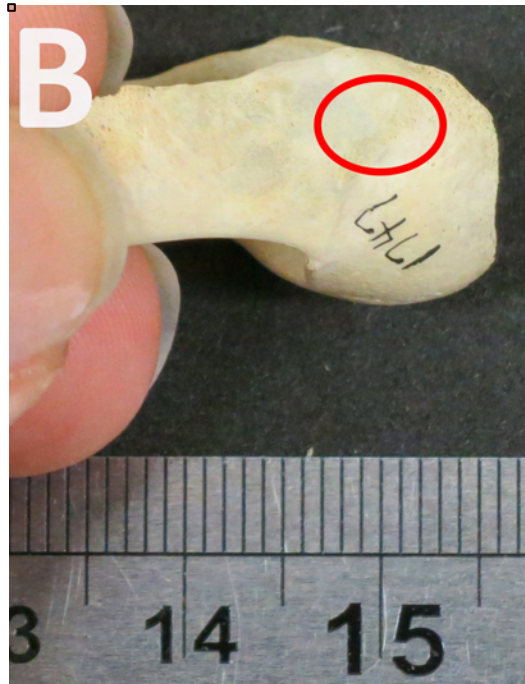
A. solstitialis (AMNH13706)

The *fenestra caudalis mandibulae* occurs in *Pars caudalis* of the mandibular ramus. According to Baumel *et al.* (1993) psittaciforms present two fenestrae, as occurs in *P. wagleri*, *P. frontatus*, *P. euops*, *P. chloropterus*, *L. branickii* and *O. manilata*. However, we found that some species lack the *fenestra caudalis mandibulae* as in the genus *Aratinga* (Figure B).

25) *Skeleton axiale, ossa faciei, ossa mandibulae, fenestra rostralis mandibulae* (lateral view): present (1) or absent (0). Character 16 in the datasets.



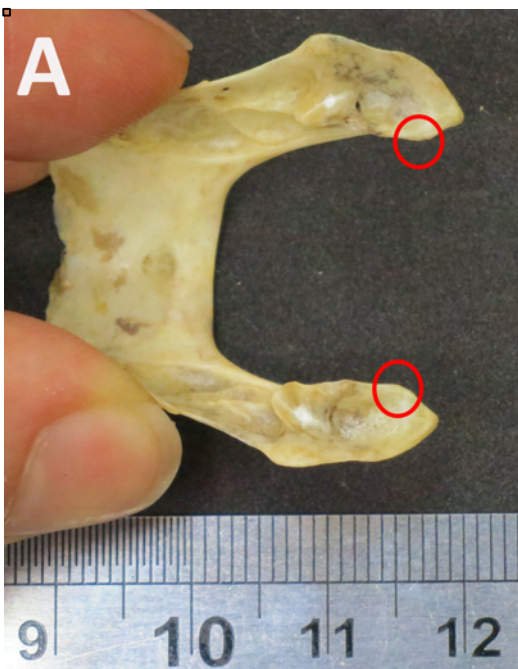
P. wagleri (AMNH3387)



P. chloropterus (FMNH337771)

Also, some species of parrots lack the *fenestra rostralis mandibulae* (Figure B) that is found in the region of the caudal intramandibular flexion zone.

26) *Skeleton axiale, ossa faciei, ossa mandibulae, proc. medialis mandibulae* shape (ventral view): rounded (0) or pointed (1). Character 17 in the datasets.



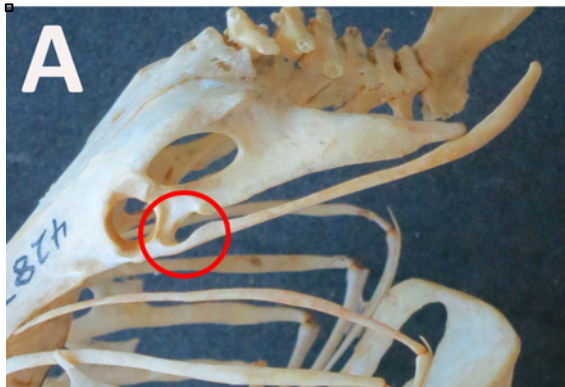
T. acuticaudatus (AMNH6907)



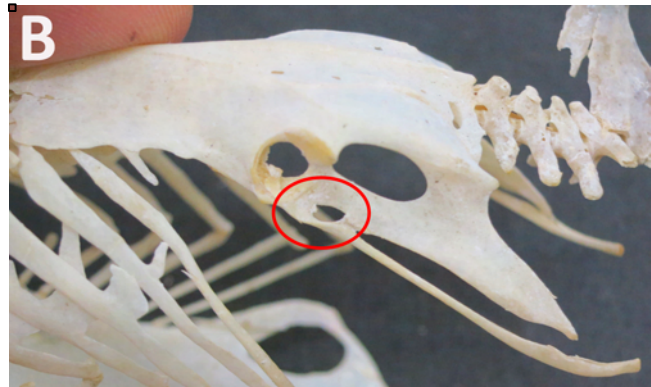
A. solstitialis (AMNH13706)

The *proc. medialis mandibulae* can be rounded as in the genus *Thectocercus* (Figure A) or pointed (Figure B).

27) *Skeleton axiale, synsacrum, foramen obturatum* (lateral view): open (0) or closed (1). Character 33 in the datasets.



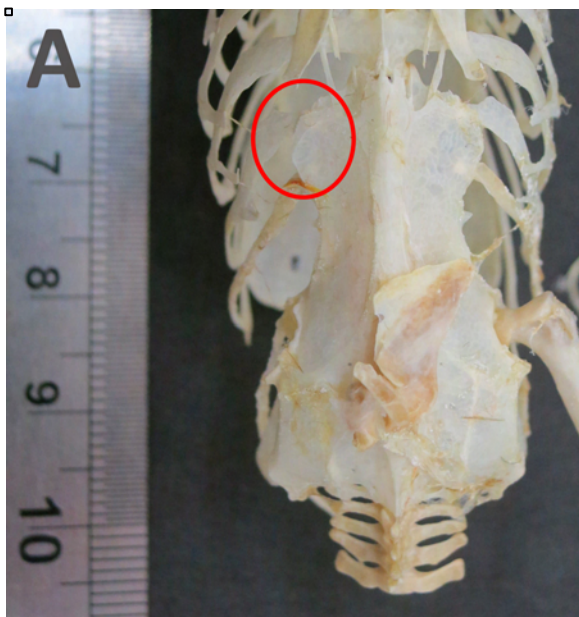
O. icterotis (USNM428769)



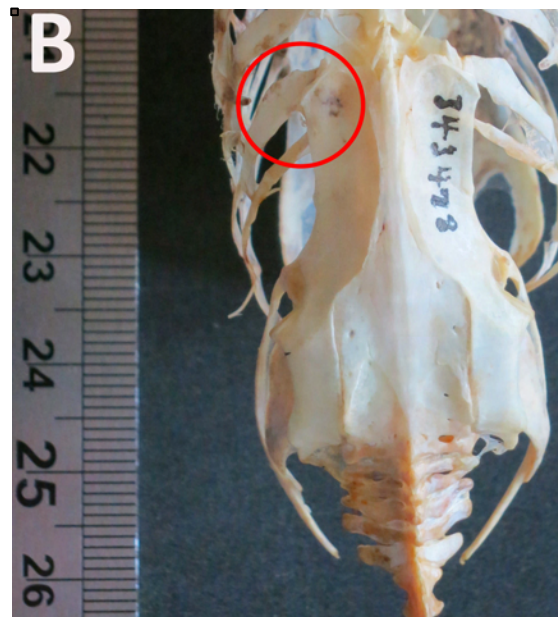
T. acuticaudatus (BMNHs/1955.5.47)

The *foramen obturatum* is an oval opening situated caudoventral to the *Acetabulum* (Baumel *et al.* 1993) that when viewed in lateral view can be open (Figure A) or closed as in the genus *Thectocercus* (Figure B).

28) *Skeleton axiale, synsacrum, ala preacetabularis ilii* shape (dorsal view): rounded (0) or pointed (1). Character 34 in the datasets.



A. jandaya (BMNHs/1981.31.8)



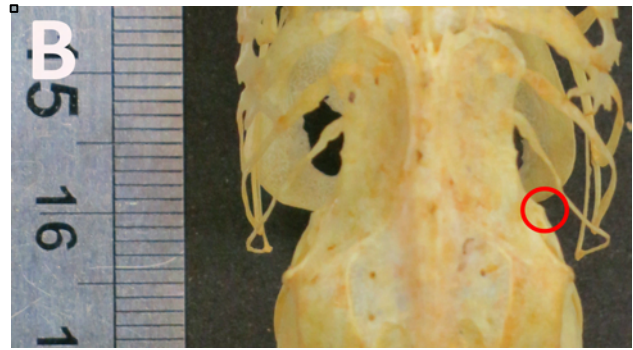
P. brevipes (USNM343478)

In the examined species the *ala preacetabularis ilii* can be rounded (Figure A) or pointed as in the genus *Thectocercus* (Figure B).

29) *Skeleton axiale, synsacrum, prominent tuberculum preacetabulare* (dorsal view): present (1) or absent (0). Character 35 in the datasets.



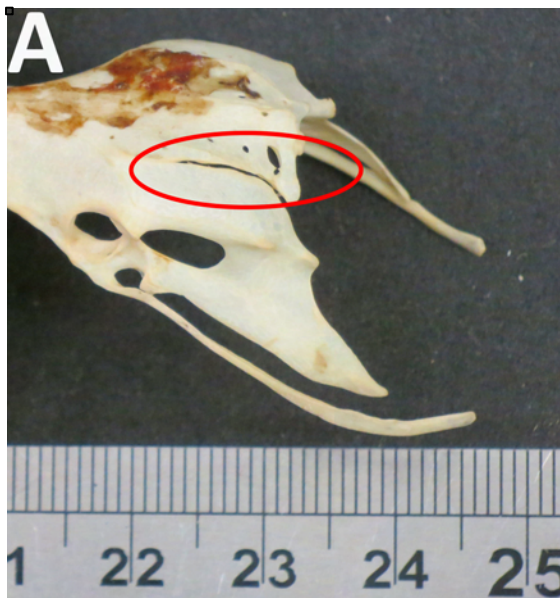
G. guarouba (USNM613781)



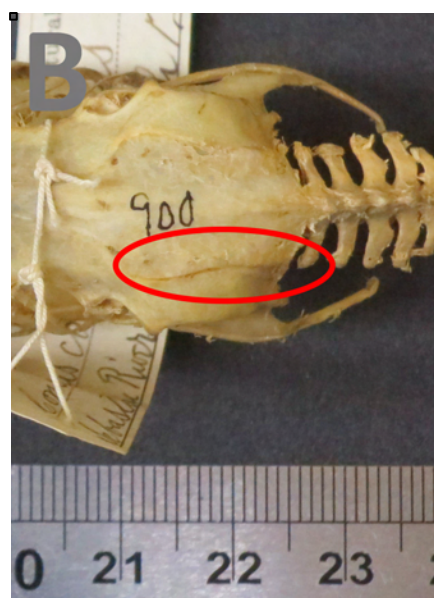
E. aurea (AMNH3948)

The *tuberculum preacetabulare* is found at the ventrocranial margin of the acetabulum (Baumel *et al.* 1993) and in parrots can be prominent as in *C. spixii*, *O. manilata* and *G. guarouba* (Figure A) or not prominent as in all taxa of *Aratinga* sensu Peters (1937).

30) *Skeleton axiale, synsacrum, sutura iliosynsacralis* (lateral and dorsal view): open (0) or closed (1). Character 36 in the datasets.



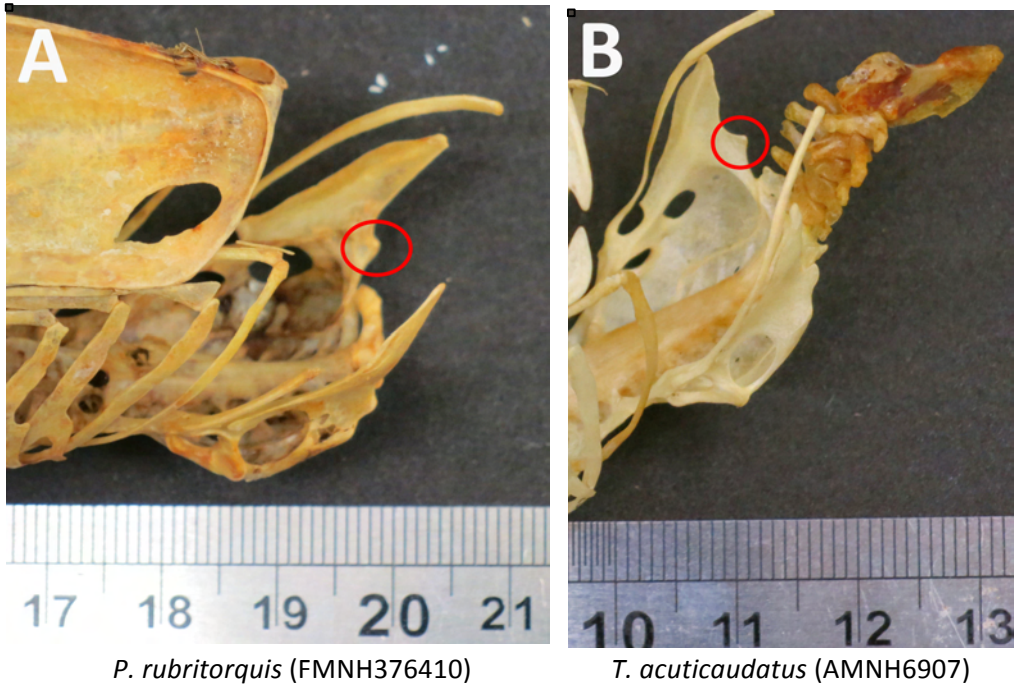
P. wagleri (FMNH337766)



C. carolinensis (AMNH900)

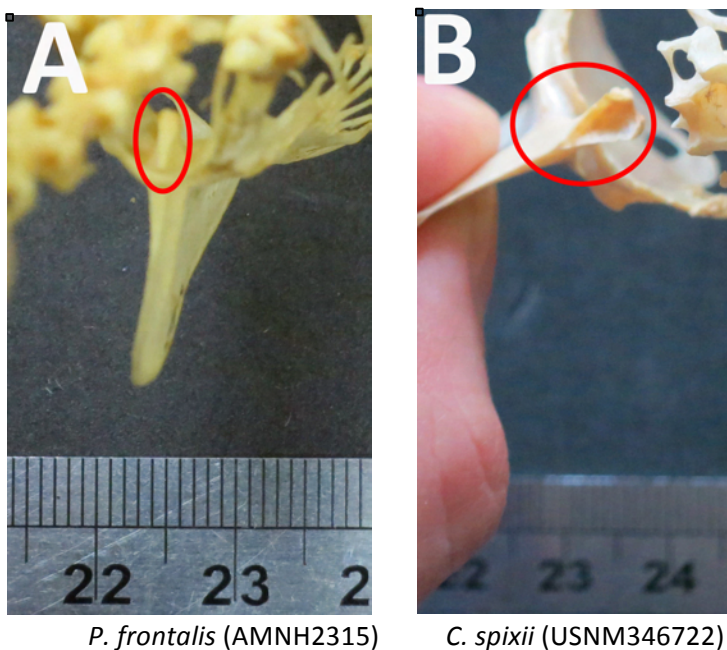
When the pelvis is viewed in lateral or dorsal view, it can be seen that the *sutura iliosynsacralis* can be open as in *P. wagleri* and *D. nobilis* (Figure A) or closed as in all other examined species (Figure B).

31) *Skeleton axiale, synsacrum, proc. marginis caudalis* shape (ventral view): rounded (0) or pointed (1). Character 37 in the datasets.



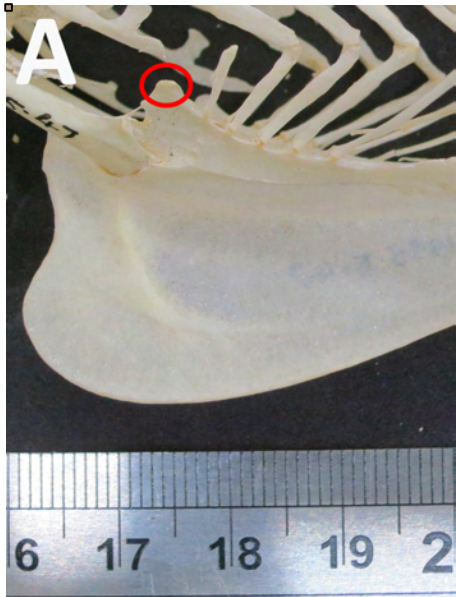
The *proc. marginis caudalis* is a projection of the caudal margin of the *Os coxae* of the pelvis between the *Spina dorsolateralis ilii* and the *proc. terminalis ischii* (Baumel *et al.* 1993). In the examined species it can be rounded (Figure A) or pointed as in the genus *Thectocercus* (Figure B).

32) *Skeleton appendiculare, rostrum sterni, spina externa rostri* shape (cranial view): thin (0) or thick (1). Character 27 in the datasets.

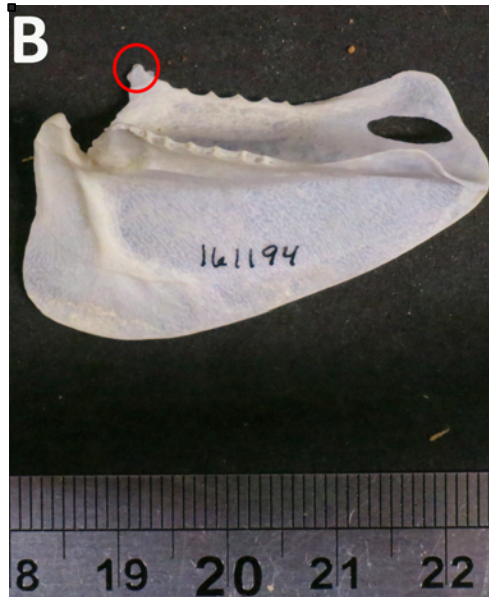


The *spina externa rostri* when viewed in cranial view can present an elongated and thin shape as in the genera *Thectocercus* and *Eupsittula* (Figure A) or be shorter and thicker (Figure B).

33) *Skeleton appendiculare, rostrum sterni, proc. craniolateralis* shape (lateral view): rounded (0) or pointed (1). Character 30 in the datasets.



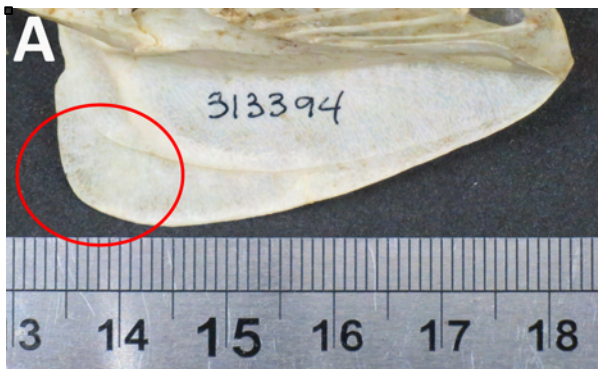
T. acuticaudatus (BMNHs/1955.5.47)



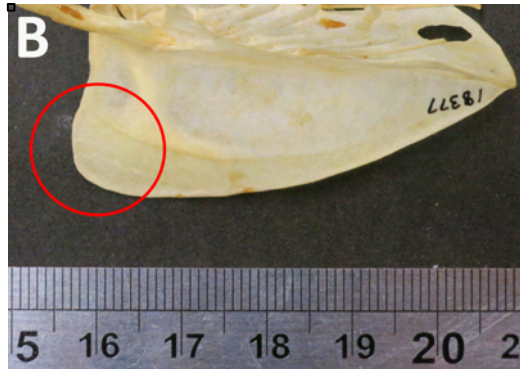
E. aurea (LSUMZ161194)

The *proc. craniolateralis* when viewed in lateral view can be more rounded (Figure A) or pointed as in the genus *Eupsittula* (Figure B).

34) *Skeleton appendiculare, sternum, apex carinae* shape (lateral view): rounded (0) or pointed (1). Character 28 in the datasets.



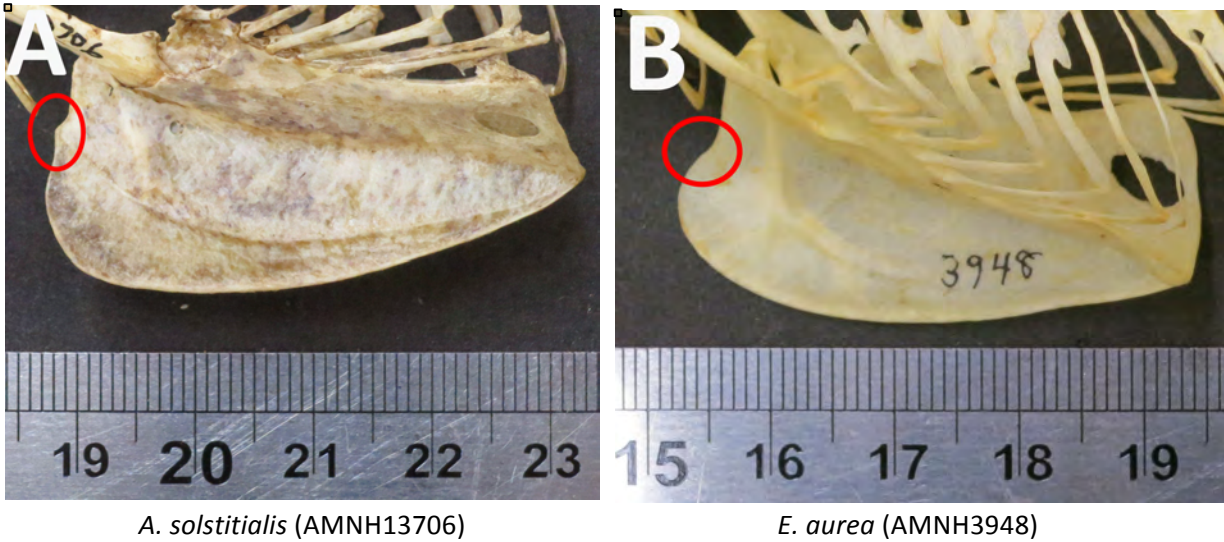
A. nenday (FMNH313394)



P. erythrogegens (AMNH18377)

The *apex carinae* of the sternum can be rounded (Figure A) or pointed as in the genera *Thectocercus*, *Eupsittula* and *Psittacara* (Figure B).

35) *Skeleton appendiculare, sternum, tuberculum cristae medianae* (lateral view): present (1) or absent (0). Character 29 in the datasets.

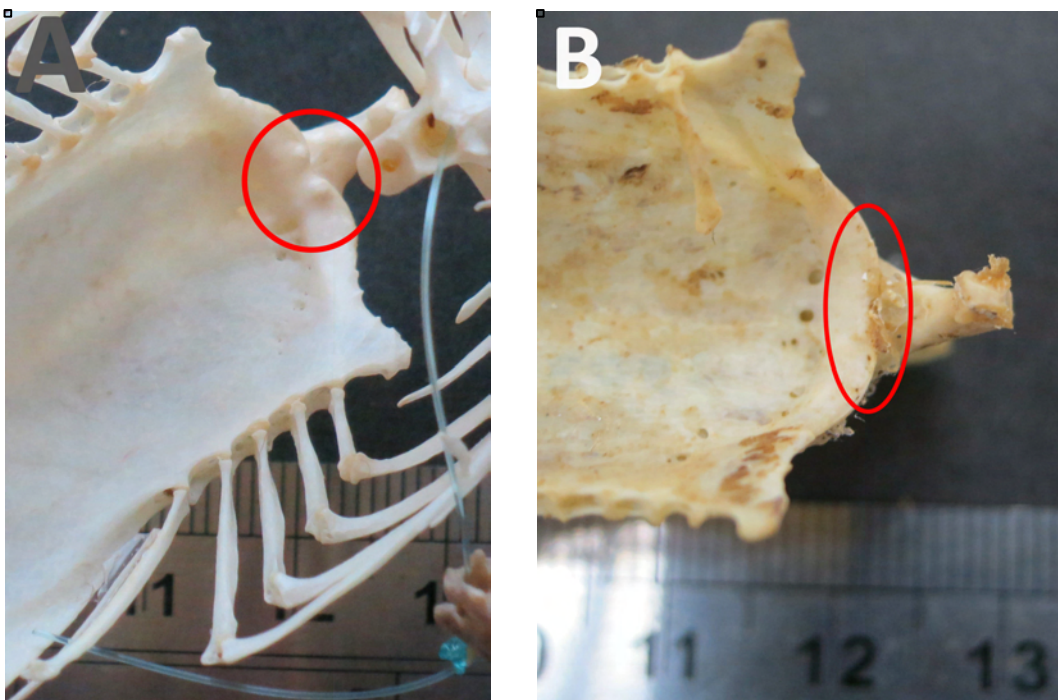


A. solstitialis (AMNH13706)

E. aurea (AMNH3948)

The *tuberculum cristae medianae* is a projection above the carina formed by the *linea intermuscular* that can be present (Figure A) or absent as in the species of the genus *Thectocercus* (Figure B).

36) *Skeleton appendiculare, sternum, pila coracoidea* with V shape (dorsal view): present (1) or absent (0). Character 31 in the datasets.

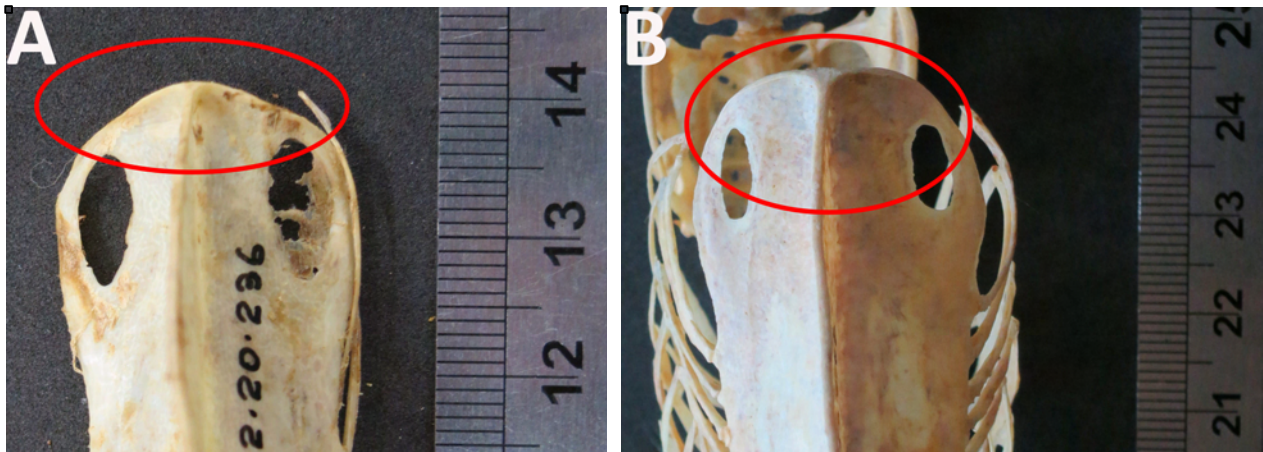


G. guarouba (USNM613782)

P. leucophthalmus (BMNH1903.12.20.236)

The *pila coracoidea* is a transversely oriented, curved pillar of bone along the cranial margin of the *Corpus sterni* (Baumel *et al.* 1993) that in some species present the shape of a “V” (Figure A), whereas in others as in the genus *Thectocercus* is less pronounced (Figure B).

37) *Skeleton appendiculare, sternum, margo caudalis* shape (ventral view): triangular (0) or squared (1). Character 32 in the datasets.

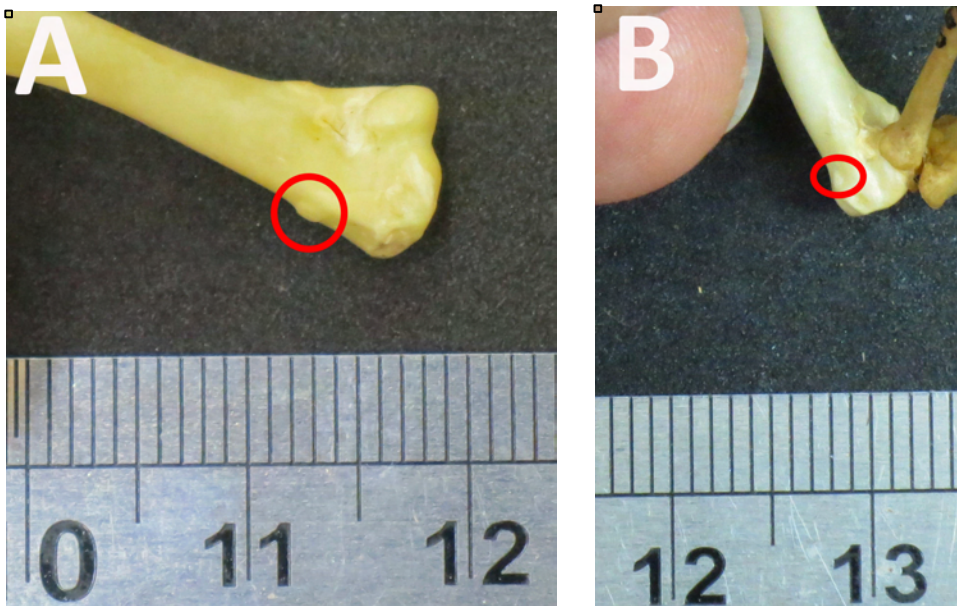


P. leucophthalmus (BMNH1903.12.20.236)

C. spixii (USNM346722)

The caudal margin of the sternum is highly variable in shape, in the examined species is mainly triangular as in the genera *Thectocercus*, *Eupsittula* and *Psittacara* or almost squared as in *A. weddellii*, *C. spixii* and *O. manilata* (Figure B).

38) *Skeleton appendiculare, humerus, prominent tuberculum supracondylare ventrale* (cranial surface): present (1) or absent (0). Character 38 in the datasets.

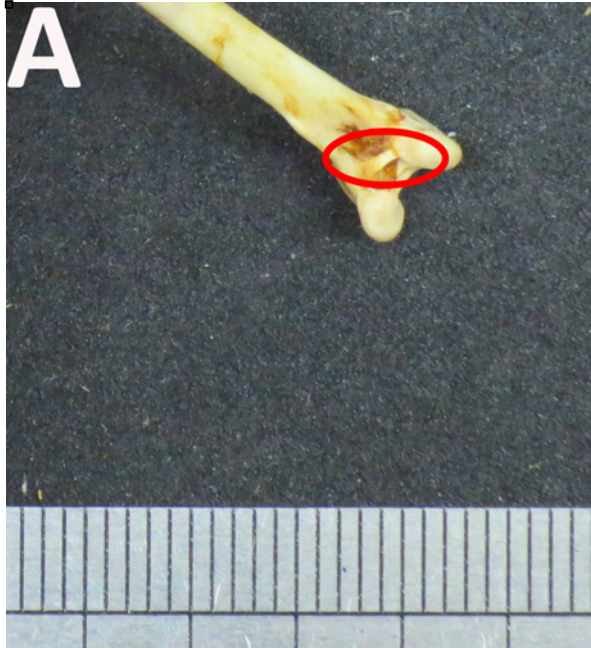


T. acuticaudatus (AMNH6907)

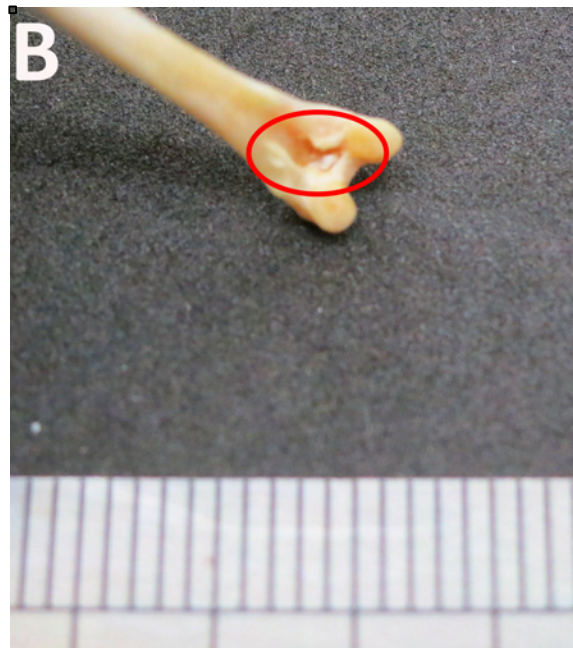
A. weddellii (FMNH320429)

The *tuberculum supracondylare ventrale* is an attachment of *Lig. collaterale* ventral of the elbow joint (Baumel *et al.* 1993) that can be prominent as in *Thectocercus* and *Eupsittula* or not prominent (Figure B).

39) *Skeleton appendiculare, tibiotarsus, pons supratendineus* ossification (cranial surface): completely ossified (1) or incompletely ossified (0). Character 39 in the datasets.



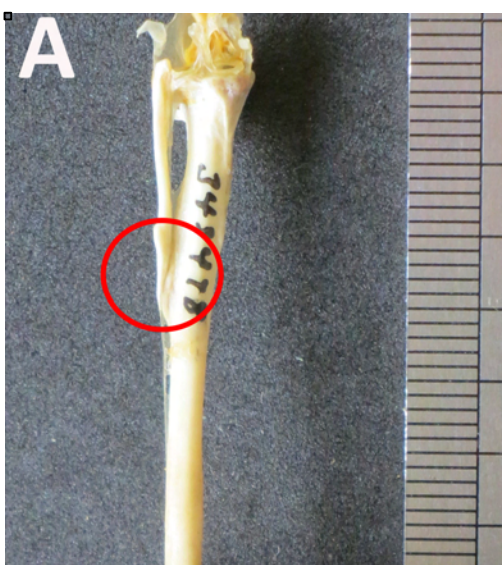
P. wagleri (FMNH337767)



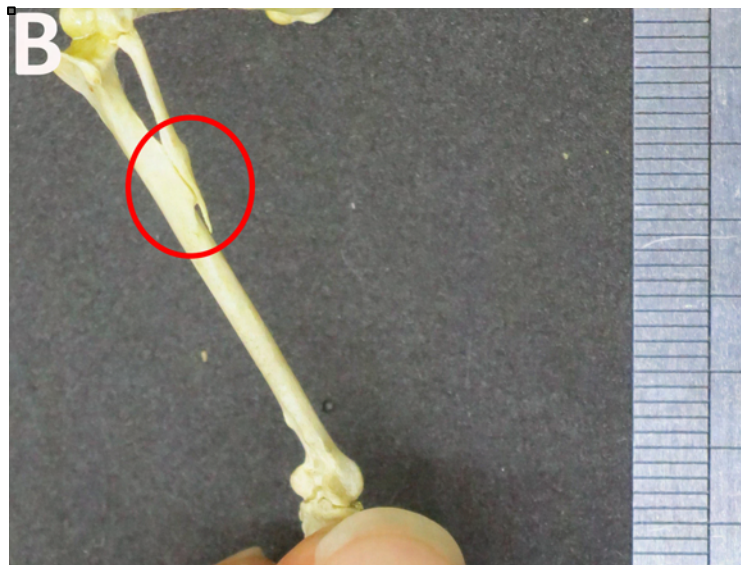
A. solstitialis (BMNHs/1983.5.2)

As already pointed out by Mayr (2010), the *pons supratendineus* ossification in parrots can be incomplete (Figure A) or complete (Figure B). He suggested that the genus *Aratinga* sensu Peters (1937) and *N. nenday* present an incompletely ossified *pons supratendineus*. We found that *Thectocercus* and *Eupsittula* exhibit an incompletely ossified *pons supratendineus*, whereas the other species can present both incomplete or complete ossification.

40) *Skeleton appendiculare, tibiotarsus, spina fibulae* ending at *crista fibularis* level (caudal and cranial surface): present (1) or absent (0). Character 40 in the datasets.



P. brevipes (USNM343478)



E. aurea (AMNH3948)

In the tibiotarsus the *spina fibulae* can present different length, it can ends at the level of the *crista fibularis* (Figure A) or it can extends over the *crista fibularis* as in the genus *Eupsittula* (Figure B).

5.2 Plumage characters

- 41) Bill coloration: Pale Pinkish Buff 121 D (0); Smoke Gray (1); Sepia 119 (2). All *Aratinga* and the majority of *Eupsittula* present black bill. *E. canicularis*, *E. nana*, *E. astec*, *E. cactorum* and *C. carolinensis* have grayish bill, whereas all *Psittacara* and *Thectocercus* exhibit whitish bill.
- 42) Bill, tip coloration: same color as entire bill (0); darker than rest of bill (1). *Psittacara*, *Thectocercus* and some *Eupsittula* (*E. canicularis*, *E. nana*, *E. astec*, *E. cactorum*) present light bill with darker tip.
- 43) Bill, mandible coloration: same as maxilla (0); darker (Sepia 119) than maxilla (1). The mandible presents same coloration as the maxilla or can be darker, such as in *D. nobilis* and *T. acuticaudatus*.
- 44) Tarsus coloration: Flesh Color 5 (0); Sepia 119 (1). *Psittacara* and *Thectocercus* exhibit flesh color tarsus, whereas *Eupsittula* and *Aratinga* (except for *A. nenday*) present black tarsus.
- 45) Periophthalmic ring coloration: white (0); dark (1); gray (2); yellow (3). Coloration of periophthalmic ring varies more within the outgroup than within the ingroup. In fact, *Psittacara* and *Thectocercus* present white, whereas *Aratinga* and *Eupsittula* exhibit both white and dark periophthalmic ring.
- 46) Area around the eye coloration: one color (0); two different colors (1); three different colors (2). The area around the eye can present several combinations of colors. However, all *Aratinga* exhibit only one coloration.
- 47) Forehead coloration: same as crown (0); same as part of crown (1); different from crown (2). Forehead can present same coloration as the crown, as in *Thectocercus*, a different color or the same coloration can extend to part of the crown.
- 48) Forehead, red coloration: absent (0); present (1). Some species of *Psittacara* are characterized by a distinct red forehead.
- 49) Crown, pigments responsible for coloration: structural + yellow pigments (0); psittacofulvins (1); structural + yellow pigments and psittacofulvins (2); structural color (3); structural and psittacofulvins (4); psittacofulvins, structural and yellow pigments (5); eumelanins (6). Parrots present characteristic pigments, such as the psittacofulvins, responsible for bright red, orange and yellow found on the crown of *Aratinga* and some *Psittacara*. Green is due to the combination of structural color with yellow pigments; whereas blue is a structural color. *Eupsittula* present mainly structural colors, sometimes mixed with psittacofulvins and yellow pigments. Eumelanins are melanins responsible for black, brown and gray, such as for the black crown of *A. nenday*.

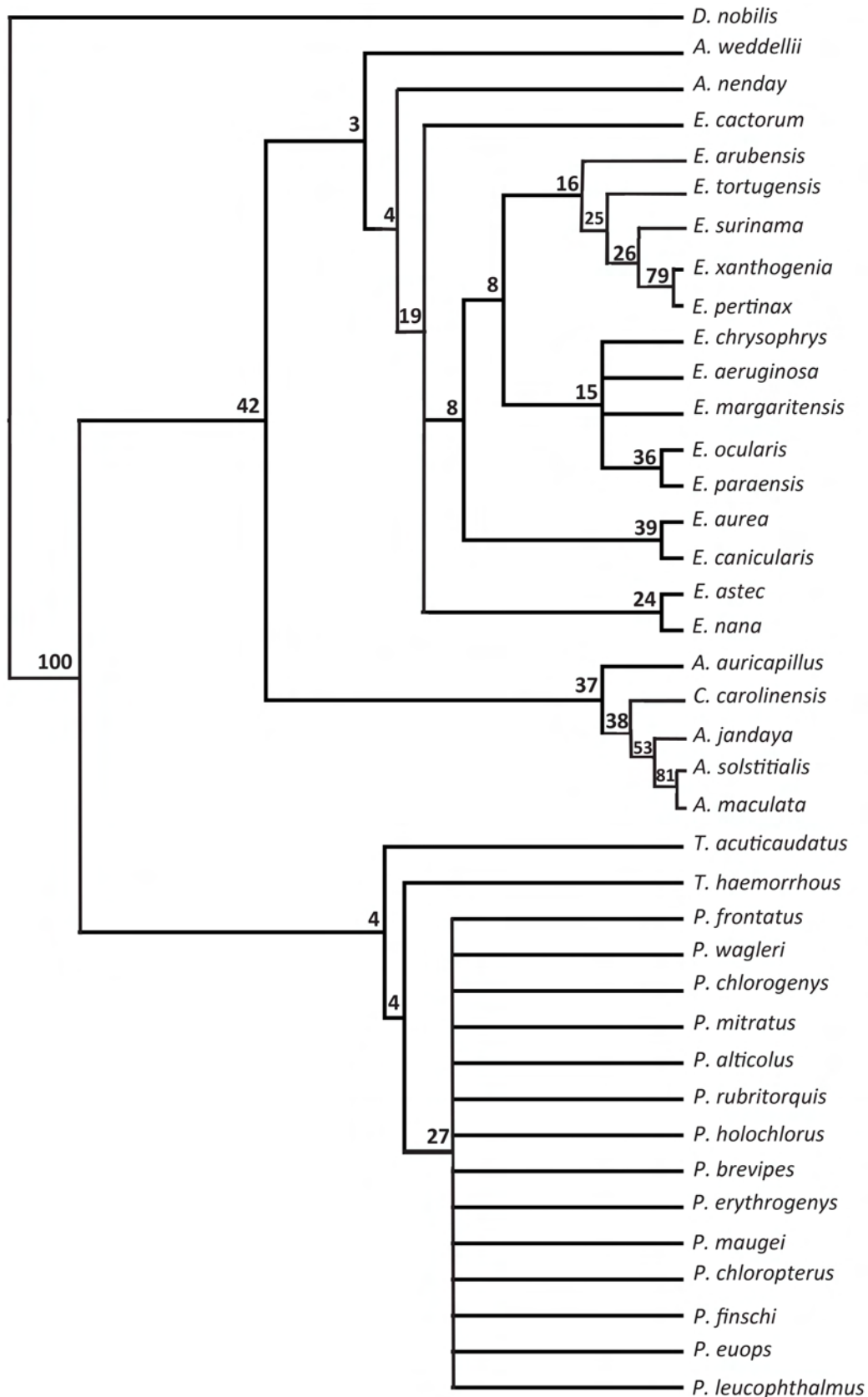
- 50) Crown coloration: green (0); red (1); green and red (2); blue (3); orangee yellow (4); orange and blue (5); yellow and blue (6); black (7). It greatly varies within the ingroup. *Psittacara* presents green or green and red, *Aratinga* mainly orangee yellow and *Eupsittula* mainly blue crown.
- 51) Nape coloration: mainly green (0); orangee yellow (1); blue (2); green and blue (3); red (4). In *Psittacara* and *Eupsittula* nape is mainly green.
- 52) Nape, presence of scattered red feathers: absent (0); present (1). Some *Psittacara* can exhibit scattered red feathers on nape.
- 53) Cheeks, pigments responsible for coloration: structural + yellow pigments (0); psittacofulvins (1); eumelanins (2); structural color (3); eumelanins and psittacofulvins (4); psittacofulvins, structural, yellow pigments (5); structural + yellow pigments and melanins (6). Psittacofulvins are the main responsible for cheek coloration in *Aratinga*, structural color and yellow pigments in *Psittacara* and eumelanins in *Eupsittula*.
- 54) Cheeks coloration: mainly green (0); orange yellow (1); red (2); blue (3); brownish (4); black (5); brownish and blue tinge (6). It greatly varies within the ingroup.
- 55) Cheeks, presence of scattered red feathers: absent (0); present (1). Some *Psittacara* and *A. nenday* can exhibit scattered red feathers on cheeks.
- 56) Auriculars, pigments responsible for coloration: structural + yellow pigments (0); psittacofulvins (1); structural color (2); eumelanins (3); eumelanins and psittacofulvins (4). Psittacofulvins are mainly responsible for the coloration of *Aratinga* auriculars, structural and yellow pigments for *Psittacara* and eumelanins for *Eupsittula*.
- 57) Auriculars coloration: mainly green (0); orange yellow (1); red (2); blue (3); brownish (4); black (5). It greatly varies among the examined species.
- 58) Auriculars, presence of scattered red feathers: absent (0); present (1). Some *Psittacara* and *A. nenday* can exhibit scattered red feathers on auriculars.
- 59) Upper throat, pigments responsible for coloration: structural + yellow pigments (0); psittacofulvins (1); structural color (2); eumelanins (3); eumelanins and psittacofulvins (4); psittacofulvins and melanins (5). Psittacofulvins are mainly responsible for the coloration of *Aratinga* upper throat, structural and yellow pigments for *Psittacara* and eumelanins for *Eupsittula*.
- 60) Upper throat, coloration: mainly green (0); orange yellow (1); blue (2); brownish (3); orangee yellow and brownish (4); black (5); red and yellow (6). It is mainly green in *Psittacara* and brownish in *Eupsittula*.
- 61) Upper throat, presence of scattered red feathers: absent (0); present (1). Some *Psittacara* can exhibit scattered red feathers on upper throat.
- 62) Throat, pigments responsible for coloration: structural + yellow pigments (0); psittacofulvins (1); structural color (2); eumelanins (3); eumelanins and psittacofulvins (4); eumelanins,

structural and yellow pigments (5). Psittacofulvins are mainly responsible for the coloration of *Aratinga* throat, structural and yellow pigments of *Psittacara* and eumelanins of *Eupsittula*.

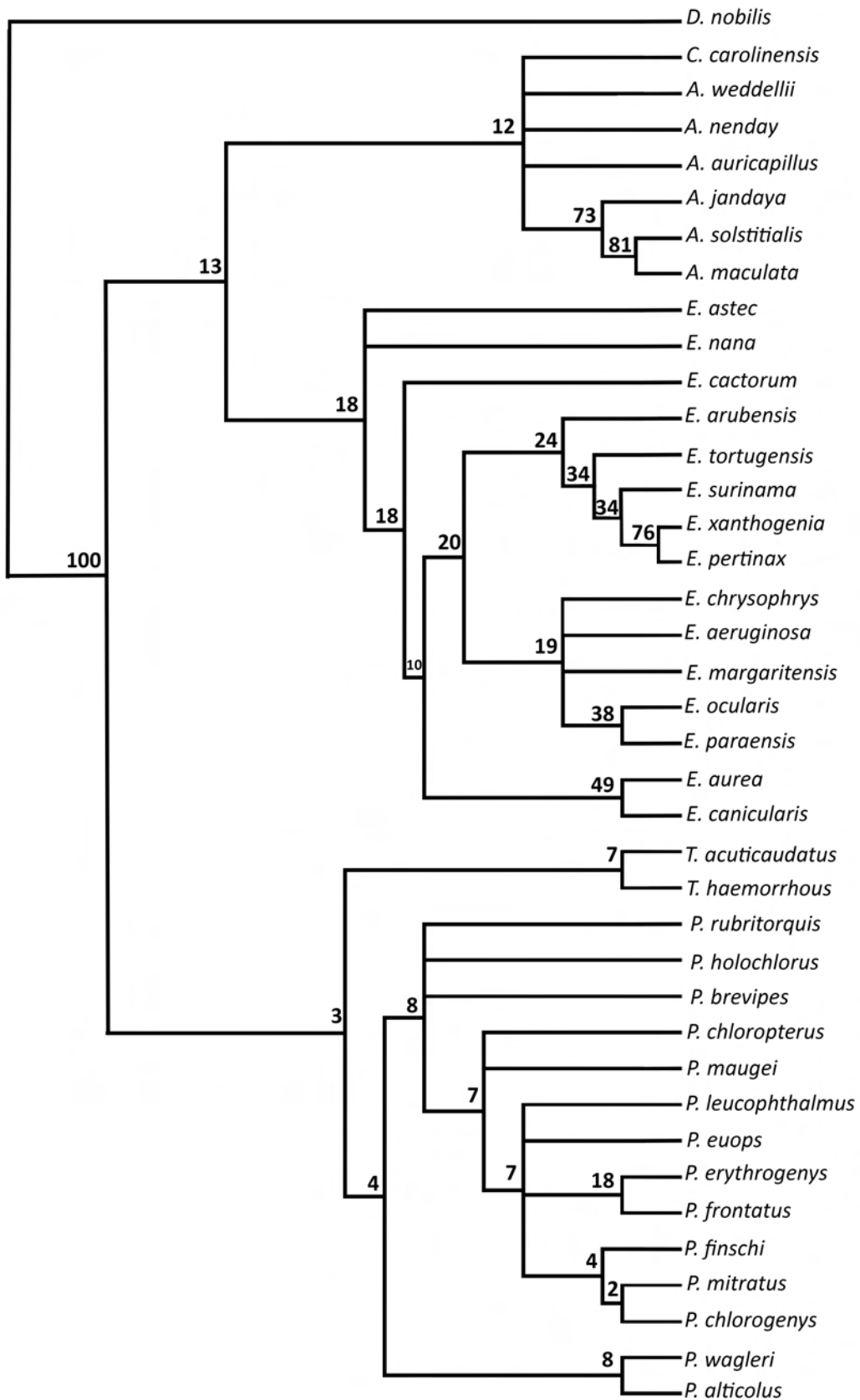
- 63) Throat coloration: mainly green (0); orange yellow (1); blue (2); brownish (3); orange-yellow and brownish (4); turquoise (5); red and yellow (6). It is mainly green in *Psittacara* and brownish in *Eupsittula*.
- 64) Throat, presence of scattered red feathers: absent (0); present (1). Some *Psittacara* can exhibit scattered red feathers on throat.
- 65) Dorsal neck coloration: green (0); orange-yellow (1); blue (2). It is green in *Thectocercus*, *Psittacara* and *Eupsittula*.
- 66) Dorsal neck, presence of scattered red feathers: absent (0); present (1). Some *Psittacara* can exhibit scattered red feathers on dorsal neck.
- 67) Scapulars coloration: green (0); orange-yellow (1); orange-yellow and green (2); blue (3); green and red (4). Scapulars are green in *Thectocercus*, *Psittacara* and *Eupsittula*.
- 68) Lesser underwing-coverts coloration: yellow-green (0); lime green (1); orange-yellow (2); orange-yellow and green (3); red (4); red and yellow (5). They are yellow-green in *Eupsittula*.
- 69) Greater underwing-coverts coloration: yellow-green (0); lime green (1); yellow (2); orange-yellow and green (3); red and yellow (4). They are yellow-green in *Eupsittula* and lime green in *Thectocercus*.
- 70) Carpal edge coloration: green (0); green and blue (1); blue (2); yellow (3); red (4); green and red (5). It is green in *Thectocercus* and green and blue in *Eupsittula*.
- 71) Bend of wing coloration: green (0); red (1); blue (2); yellow (3); green and yellow (4). It is green in *Thectocercus* and *Eupsittula*.
- 72) Lesser wing-coverts coloration: green (0); blue (1); yellow (2); yellow and green (3). They are green in *Thectocercus*, *Psittacara* and *Eupsittula*.
- 73) Median wing-coverts coloration: green (0); blue (1); yellow (2). All ingroup taxa present green coloration.
- 74) Greater primary-coverts coloration: green (0); paris green (1); green and blue (2); dark blue and black (3); dark blue (4). They are mainly dark blue in *Aratinga*, green in *Psittacara* and paris green in the majority of *Eupsittula*.
- 75) Greater secondary-coverts coloration: green (0); blue (1); green and blue (2); yellow (3). All ingroup taxa present green coloration.
- 76) Folded secondaries coloration: green (0); green and yellow (1); yellow (2); blue (3); green and black (4). They are green in *Thectocercus*, *Psittacara* and *Eupsittula*.

- 77) Rump coloration: green (0); yellow (1); green and red (2); green and yellow (3); blue (4). It is green in *Thectocercus*, *Psittacara* and *Eupsittula*.
- 78) Breast coloration: green (0); green and red (1); green and orange-yellow (2); orange-yellow (3); green and blue (4); yellow (5). It is mainly green in *Psittacara*, green and orange-yellow in *Eupsittula*.
- 79) Belly coloration: green (0); green and red (1); green and orange-yellow (2); orange-yellow (3); green and blue (4); yellow (5). It is mainly green in *Psittacara*, green and orange-yellow in *Eupsittula*.
- 80) Crural feathers coloration: green (0); green and orange-yellow (1); green with red (2); orange-red (3); orange with green (4); yellow (5). They are green in *Thectocercus* and mainly green and orange-yellow in *Eupsittula*.
- 81) Primaries coloration: green with black edges (0); green, blue and black edges (1); green, dark blue and black edges (2); paris green, blue and black edges (3); blue with black edges (4); green, blue, olive-yellow and black edges (5). *Aratinga* present green, dark blue and black edges primaries. *Thectocercus* have green, blue and black edges. *Psittacara* exhibit green with black edges. *Eupsittula* present paris green, blue and black edges primaries.
- 82) Secondaries coloration: green with black edges (0); green, blue and black edges (1); green, dark blue and black edges (2); paris green, blue and black edges (3); blue with black edges (4); green, blue, olive-yellow and black edges (5); green with yellow, dark blue and black edges (6). Secondaries coloration varies within the ingroup as primaries coloration, with the exception of *A. maculata* and *A. solstitialis* that present green with yellow, dark blue and black edges secondaries.
- 83) Underwing-coverts coloration: grayish-olive (0); brownish-olive (1); glaucous (2); olive-green and yellow (3). They are brownish-olive in *Aratinga* and *Eupsittula*, grayish-olive in *Thectocercus* and *Psittacara*.
- 84) Upperside of tail coloration: green (0); green and blue (1); olive-green, dark blue and black edges (2); green and paris green (3); blue (4). It is olive-green, dark blue and black edges in *Aratinga*; green and blue in *Thectocercus*; green in *Psittacara*; green and paris green in *Eupsittula*.
- 85) Underside of tail coloration: brownish-olive (0); grayish-olive (1); grayish-olive and ferruginous (2); olive green (3); reddish (4). It is brownish-olive in *Aratinga*, grayish-olive and ferruginous in *Thectocercus*; grayish-olive in *Psittacara* and *Eupsittula*.

Appendix 6. Strict consensus tree based on the analysis of 45 plumage characters, including 37 ingroup and 2 outgroup (*D. nobilis* and *C. carolinensis*) taxa. Bootstrap support is reported above the nodes.



Appendix 7. Strict consensus tree based on the analysis combining datasets and including 37 ingroup and 2 outgroup (*D. nobilis* and *C. carolinensis*) taxa. Bootstrap support is reported above the nodes.



Appendix 8. Description of both ambiguous and unambiguous characters optimized with ACCTRAN algorithm, based on the strict consensus obtained combining datasets (Figure 3).

8.1 Osteological characters

Char1: The state (0) is the plesiomorphic, the apomorphic (1) has been independently acquired by *T. haemorrhous*, *P. frontalis*, *O. icterotis*, *C. spixii*, *A. nenday*, *E. nana*, *E. aurea* and supports clade 23 (*A. solstitialis* + *A. maculata*).

Char2: The plesiomorphic state is (0). The apomorphic state (1) supports clade 5, with a reversal to state (0) in *P. euops* and *P. erythrogyne*; and clade 14, with a reversal to state (0) in *A. ararauna*, *A. jandaya* and *E. astec*.

Char3: The state (0) is plesiomorphic, state (1) is the apomorphic and supports clade 2, with a reversal to state (0) in *P. rubritorquis* and in clade 8, where only *P. finschi* presents the apomorphic state. The state (1) has also been independently acquired by *L. branickii* and *A. weddellii*.

Char4: The state (0) is the plesiomorphic, the apomorphic (1) has been independently acquired by *P. wagleri*, clade 7 (*P. chloropterus* + *P. maugei*), *P. leucophthalmus* and *P. maracana*.

Char5: The plesiomorphic state is (1) and the apomorphic (0) occurs in *P. rubritorquis*, clade 6 (*P. brevipes* (*P. chloropterus* + *P. maugei*)), *P. chlorogenys*, *O. icterotis*, *A. weddellii*, *C. spixii*, and *C. carolinensis*.

Char6: The state (0) is the plesiomorphic, the apomorphic (1) is found in clade 6, *O. manilata*, clade 16 (*A. weddellii* (*P. maracana* (*C. spixii* + *A. ararauna*))), and clade 23.

Char7: The state (0) is the plesiomorphic, the apomorphic (1) is found in clade 2, with a reversion to the plesiomorphic state in clade 3 (*P. wagleri* + *P. frontatus*); and it has been independently acquired by *O. icterotis*, *A. weddellii*, *A. ararauna* and *C. carolinensis*.

Char8: The plesiomorphic state is (1) and the apomorphic (0) is synapomorphic for clade 9 with a reversal to state (1) in *O. icterotis*, *C. carolinensis*, clade 25 (*E. astec* + *E. nana*) and clade 30 (*E. aeruginosa*, *E. margaritensis* (*E. chrysophrys* (*E. ocularis* + *E. paraensis*))).

Char9: The state (0) is the plesiomorphic, the apomorphic (1) is found in clade 3, *T. haemorrhous*, *P. rubritorquis*, clade 13 (*G. guarouba* + *O. icterotis*), clade 16 (*A. weddellii* (*P. maracana* (*C. spixii* + *A. ararauna*))), *A. jandaya* and clade 25.

Char10: The state (1) is the plesiomorphic, the apomorphic (0) is found in *P. wagleri*, clade 4 (*T. acuticaudatus* + *T. haemorrhous*), *P. erythrogyne*, *P. frontalis*, *C. spixii*, *C. carolinensis* and *E. canicularis*.

Char11: The state (1) is the plesiomorphic, the apomorphic (0) occurs in *P. euops*, *P. frontalis*, *P. maracana*, clade 26 (*C. carolinensis* (*A. jandaya* (*A. solstitialis* + *A. maculata*))) with a reversal in *A. jandaya*, and clade 31 (*E. ocularis* + *E. paraensis*).

Char12: The state (1) is the plesiomorphic, the apomorphic (0) occurs in clade 7, *P. euops*, *P. frontalis*, *L. branickii*, *C. spixii*, clade 19 (*A. nenday* (*A. auricapillus* (*C. carolinensis* (*A. jandaya* (*A. solstitialis* + *A. maculata*)) and clade 26.

Char13: The state (0) is the plesiomorphic and the apomorphic (1) is found in *P. euops*, and clade 14 with a reversal in *C. spixii* and *A. auricapillus*.

Char14: The state (0) is the plesiomorphic and the apomorphic (1) occurs in clade 2 with a reversal in clade 5. Within clade 5, *P. finschi* and *P. chlorogenys* present the apomorphic state (1). The apomorphic state is also found in clade 11 ((*L. branickii* + *O. manilata*) (*G. guarouba* + *O. icterotis*)) with a reversal in *L. branickii*, and in clade 17 *P. maracana* (*C. spixii* + *A. ararauna*).

Char15: The state (0) is the plesiomorphic and the apomorphic (1) is found in clade 2 with a reversal in *P. holochlorus*, *P. finschi*, *P. chlorogenys*, *P. leucophthalmus* and *P. erythrogyens*; clade 11 with a reversal in *O. icterotis*; *C. carolinensis* and *E. astec*.

Char16: The state (0) is the plesiomorphic and the apomorphic (1) occurs in clade 3, *P. holochlorus*, *P. rubritorquis*, *P. finschi*, *P. euops*, clade 10 (*P. frontalis* ((*L. branickii* + *O. manilata*) (*G. guarouba* + *O. icterotis*))) with a reversal in *G. guarouba*; *C. spixii*, *A. nenday*, clade 23 and clade 28 (*E. canicularis* + *E. aurea*).

Char17: The state (0) is the plesiomorphic and the apomorphic (1) is found in *P. finschi*, *A. weddellii*, clade 20 (*A. auricapillus* (*C. carolinensis* (*A. jandaya* (*A. solstitialis* + *A. maculata*)) with a reversal in *A. jandaya*, and in *E. aurea*.

Char18: The state (1) is the plesiomorphic and the apomorphic (0) is synapomorphic for the clade 9 with a reversal in *A. ararauna*, *C. carolinensis* and *E. astec*.

Char19: The state (0) is the plesiomorphic and the apomorphic (1) occurs in clade 7, clade 8 with a reversal in *P. finschi* and *P. chlorogenys*, clade 12 (*L. branickii* + *O. manilata*), *A. weddellii*, *C. carolinensis*, *E. canicularis* and clade 30 with a reversal in *E. margaritensis*.

Char20: The state (1) is the plesiomorphic and the apomorphic (0) is found in clade 12, *C. spixii*, clade 23 and *E. astec*.

Char21: The state (0) is the plesiomorphic and the apomorphic (1) occurs in *D. nobilis*, clade 5, *O. icterotis*, and clade 19 with a reversal in clade 22 (*A. jandaya* (*A. solstitialis* + *A. maculata*)).

Char22: The state (1) is the plesiomorphic and the apomorphic (0) is found in *O. manilata*, *O. icterotis*, and clade 15 where it reverts to the plesiomorphic state in *C. carolinensis*.

Char23: The state (0) is the plesiomorphic and the apomorphic (1) is synapomorphic for the clade 1, with reversals in clade 4, *T. haemorrhous*, *P. euops*, *O. icterotis*, *E. nana*, *E. aurea*, *E. margaritensis*, *E. surinama* and clade 15 where the plesiomorphic state is acquired by *C. carolinensis*.

Char24: The state (0) is the plesiomorphic, the apomorphic (1) occurs in clade 5 with a reversal in clade 7 and clade 8. Within clade 8, *P. finschi* and *P. chlorogenys* present the apomorphic state.

Char25: The state (1) is the plesiomorphic and the apomorphic (0) is found in clade 4, *P. rubritorquis*, *P. chlorogenys*, *P. erythrogegens*, clade 11, clade 16, *A. auricapillus* and clade 26.

Char26: The state (1) is the plesiomorphic and the apomorphic (0) occurs in clade 7, *P. frontalis*, clade 19 with a reversal in clade 21, where *A. jandaya* presents the apomorphic state. Also clade 26 presents the state (0) with a reversal in *E. canicularis*.

Char27: The state (0) is the plesiomorphic, the apomorphic (1) supports clade 3, clade 11, clade 17, and clade 22.

Char28: The state (1) is the plesiomorphic, the apomorphic (0) is synapomorphic for clade 15, where the plesiomorphic state reappeared in clade 17 and in *A. jandaya*.

Char29: The state (0) is the plesiomorphic, the apomorphic (1) supports clade 5 with a reversal in *P. euops*; clade 15 with a reversal in *A. weddellii* and *C. spixii*; *E. astec* and *E. aeruginosa*.

Char30: The state (1) is the plesiomorphic, the apomorphic (0) supports clade 2 with reversal in *T. haemorrhous* and in clade 5, where the plesiomorphic state reappears in clade 6 and clade 8. Also clade 20 presents the apomorphic state (0).

Char31: The state (1) is the plesiomorphic, the apomorphic (0) supports clade 2 with reversal in clade 3, *P. brevipes*, *P. chlorogenys* and *P. euops*. The state (0) also occurs in *O. icterotis* and in clade 15, where clade 18 and clade 23 present the plesiomorphic state.

Char32: The state (0) is the plesiomorphic, the apomorphic (1) is found in *O. manilata*, *A. weddellii* and *C. spixii*.

Char33: The state (1) is the plesiomorphic, the apomorphic (0) occurs in *P. frontatus*, clade 7, clade 8, *O. manilata*, *O. icterotis* and clade 15, whereas clade 18 and *C. carolinensis* present the plesiomorphic state.

Char34: The state (0) is the plesiomorphic, the apomorphic (1) is found in clade 4, *P. brevipes*, *P. euops*, *P. erythrogegens*, *P. frontalis*, *E. nana*, *E. margaritensis* and clade 15, whereas clade 20 present state (0) with a reversal to state (1) in *C. carolinensis*.

Char35: The state (0) is the plesiomorphic, the apomorphic (1) occurs in *O. manilata*, *G. guarouba* and *C. spixii*.

Char36: The state (0) is the plesiomorphic, the apomorphic (1) is synapomorphic for clade 2 that constitutes the ingroup, with a reversal in *P. wagleri*.

Char37: The state (1) is the plesiomorphic, the apomorphic (0) is found in *P. rubritorquis*, clade 6, *P. euops*, *P. erythrogegens*, clade 10 with a reversal in *L. branickii*; *A. weddellii*, clade 20 with a reversal in clade 22; *E. astec* and *E. margaritensis*.

Char38: The state (1) is the plesiomorphic, the apomorphic (0) occurs in clade 6, *P. euops*, *P. frontalis*, *A. weddellii* and *C. spixii*.

Char39: The state (0) is the plesiomorphic, the apomorphic (1) supports clade 2 with reversal in clade 4, clade 6, *P. finschi* and *P. chlorogenys*. It is also present in *P. frontalis*, *G. guarouba*, clade 17 with a reversal to state (0) in *A. ararauna*, and *C. carolinensis*.

Char40: The state (0) is the plesiomorphic, the apomorphic (1) is found in *P. brevipes* and *P. euops*.

8.2 Plumage characters

Char41: The state (0) is the plesiomorphic, state (2) supports the clade 9, with the exception of *G. guarouba* that presents state (0); *C. carolinensis* that presents state (1); and clade 24 that presents state (1) with a reversion to state (2) in clade 27.

Char42: The state (0) is the plesiomorphic, state (1) is apomorphic and supports clade 2 with a reversal to state (0) in *P. finschi*. The state (1) is also found in *C. carolinensis* and in clade 24 with a reversal to state (0) in clade 27.

Char43: The state (0) is the plesiomorphic, the apomorphic (1) is found in *D. nobilis* and *T. acuticaudatus*.

Char44: The state (1) is the plesiomorphic, the apomorphic (0) supports clade 2 and has been independently acquired by *G. guarouba* and *A. nenday*.

Char45: The state (0) is the plesiomorphic, the state (1) is found in clade 19 with a reversal to (0) in *C. carolinensis*; clade 27 with a reversal to (0) in *E. surinama*; and in clade 30, where *E. paraensis* presents state (0). The state (2) is found in *P. finschi* and *C. spixii*, whereas state (3) in *O. manilata*.

Char46: The state (0) is the plesiomorphic, the state (1) occurs in *D. nobilis*, *P. frontalis*, *T. haemorrhous*, *P. finschi*, *P. chlorogenys*, *P. alticolus*, *L. branickii*, *O. icterotis*, *A. ararauna* and clade 34. The state (2) supports clade 31.

Char47: The state (0) is the plesiomorphic, the state (1) occurs in *E. astec* and clade 35. The state (2) is found in *P. wagleri*, clade 8 with a reversal to state (0) in *P. leucophthalmus* and *P. euops*; clade 10 with a reversal to state (0) in *G. guarouba*; clade 17, clade 19, and clade 27 with a reversal to state (0) in clade 31 and to state (1) in clade 35.

Char48: The state (0) is the plesiomorphic, the apomorphic (1) occurs in clade 3; clade 8 with reversal in *P. leucophthalmus* and *E. euops*; and *P. maracana*.

Char49: The state (3) is the plesiomorphic, state (0) supports clade 5 with reversal to state (5) in *P. finschi*, *P. chlorogenys*, *P. euops* and *P. mitratus*; and reversal to state (1) in *P. erythrogegens*. It also occurs in clade 10 with reversal to state (3) in *O. manilata* and to state (1) in *G. guarouba*; and in clade 25. The state (1) supports clade 3, *P. erythrogegens*, *G. guarouba* and clade 19 except for *A. nenday* that presents state (6). The state (4) supports the clade 28. The state (5) is found in clade 8 with reversal to state (0) in *P. leucophthalmus* and *P. alticolus*.

Char50: The state (3) is the plesiomorphic, state (1) is found in clade 3 and *P. erythrogegens*. The state (2) supports the clade 8 with reversal to state (0) in *P. leucophthalmus* and *P. alticolus*; and reversal to state (1) in *P. erythrogegens*. The state (4) is found in *G. guarouba* and in clade 19 with

reversal to state (7) in *A. nenday*. The state (5) supports clade 28. The state (6) supports the clade 35.

Char51: The state (0) is the plesiomorphic. The state (1) is found in *G. guarouba* and clade 21. The state (2) supports clade 16 with reversal to state (3) in *P. maracana* and to state (0) in *C. spixii*. The state (4) occurs in *P. erythrogegens*.

Char52: The state (0) is the plesiomorphic. The state (1) is the apomorphic and is found in *P. rubritorquis* and *P. euops*.

Char53: The state (0) is the plesiomorphic. The state (1) occurs in *P. erythrogegens*, *P. mitratus*, clade 13, clade 21 and clade 34. The state (2) is found in *A. ararauna*, *A. nenday*; and in clade 26 with reversal to state (4) in clade 32, and to state (1) in clade 34. The state (3) occurs in *T. acuticaudatus*, and in clade 16 with reversal to state (2) in *A. ararauna*. The state (5) is found in *O. manilata* and state (6) in *P. frontalis*.

Char54: The state (0) is the plesiomorphic. The state (1) supports clade 13, clade 21 and clade 32. The state (2) occurs in *P. erythrogegens* and *P. mitratus*. The state (3) is found in *T. acuticaudatus* and clade 16. The state (4) supports clade 26, with reversal to state (6) in clade 28 and to state (1) in clade 32. The state (5) occurs in *A. nenday*.

Char55: The state (0) is the plesiomorphic, the state (1) is the apomorphic and occurs in *P. rubritorquis*, and in clade 8 with reversal in *P. erythrogegens* and *P. mitratus*.

Char56: The state (0) is the plesiomorphic. The state (1) is found in *P. brevipes*, clade 11, *A. ararauna*, clade 21 and clade 35. The state (2) occurs in *T. acuticaudatus*, and in clade 16 with a reversal to state (1) in *A. ararauna*. The state (3) is found in *A. nenday* and clade 30. The state (4) supports clade 27 with reversal to state (3) in clade 30 and to state (1) in clade 35.

Char57: The state (0) is the plesiomorphic. The state (1) supports clade 11, clade 21 and clade 32. The state (2) is found in *P. erythrogegens*. The state (3) occurs in *T. acuticaudatus* and clade 16. The state (4) supports the clade 27 with reversal to state (1) in clade 32. The state (5) is found in *A. nenday*.

Char58: The state (0) is the plesiomorphic, the apomorphic (1) occurs in *P. wagleri*, and in clade 8 with reversal to state (0) in *P. erythrogegens* and *P. alticolus*.

Char59: The state (0) is the plesiomorphic. The state (1) is found in *P. rubritorquis*, *G. guarouba*, clade 21 and clade 35. The state (2) occurs in *T. acuticaudatus*, and in clade 17 with reversal to state (3) in *A. ararauna*. The state (3) supports clade 14 with reversal to state (2) in clade 17 and to state (3) in *A. ararauna*; reversal to state (0) in *A. auricapillus* and to state (1) in clade 21. The state (4) is found in clade 33 with reversal to state (1) in clade 35. The state (5) is found in *P. frontalis*.

Char60: The state (0) is the plesiomorphic. The state (1) occurs in *G. guarouba*, clade 21 and clade 33. The state (2) is found in *T. acuticaudatus* and clade 16. The state (3) supports clade 24 with reversal to state (1) in clade 33. The state (5) is found in *A. nenday* and the state (6) in *P. rubritorquis*.

Char61: The state (0) is the plesiomorphic. The state (1) is the apomorphic and occurs in *P. wagleri*, *P. holochlorus*, and clade 8 with reversal in *P. alticolus*.

Char62: The state (0) is the plesiomorphic. The state (1) is found in *P. rubritorquis*, *G. guarouba*, clade 21 and clade 35. The state (2) occurs in *C. spixii* and *A. nenday*. The state (3) is found in *A. weddellii*, and in clade 24 with reversal to state (4) in clade 33 and to state (1) in clade 35. The state (4), besides in clade 33 with reversal to state (1) in clade 35, occurs in *P. frontalis*. The state (5) is found in *A. ararauna*.

Char63: The state (0) is the plesiomorphic. The state (1) occurs in *G. guarouba*, clade 21 and clade 33. The state (2) is found in clade 16 with a reversal to state (0) in *P. maracana*. The state (3) supports clade 24 with a reversal to state (1) in clade 33. The state (5) occurs in *A. nenday* and the state (6) in *P. rubritorquis*.

Char64: The state (0) is the plesiomorphic. The state (1) is the apomorphic and occurs in *P. holochlorus*, and in clade 8 with reversal in *P. chlorogenys*, *P. erythrogyens* and *P. alticolus*.

Char65: The state (0) is the plesiomorphic. The state (1) is found in *G. guarouba* and in clade 23. The state (2) occurs in clade 18.

Char66: The state (0) is the plesiomorphic. The state (1) is apomorphic and occurs in *P. chlorogenys*, *P. leucophthalmus* and *P. mitratus*.

Char67: The state (0) is the plesiomorphic. The state (1) is found in *G. guarouba* and *A. solstitialis*. The state (2) occurs in *A. maculata*. The state (3) is found in clade 13 and state (4) in *P. frontalis*.

Char68: The state (0) is the plesiomorphic. The state (1) is found in clade 4, and in clade 14 with reversal to state (3) in clade 20 and to state (2) in *A. solstitialis*. The state (3) supports clade 20 with reversal to state (2) in *A. solstitialis*. State (2) occurs also in *G. guarouba*. The state (4) occurs in *P. frontatus*, *P. chloropterus*, *P. finschi*, *P. leucophthalmus*, *P. euops* and *P. erythrogyens*. The state (5) is found in *P. maugei*.

Char69: The state (0) is the plesiomorphic. The state (1) supports clade 4; clade 14 with reversal to state (2) in clade 17, to state (3) in clade 20 (where *C. carolinensis* presents state (1) and *A. solstitialis* state (2)), to state (0) in clade 24. The state (2) occurs in *P. finschi*, *P. leucophthalmus*, *G. guarouba*, clade 17 and *A. solstitialis*. The state (4) occurs in clade 7.

Char70: The state (0) is the plesiomorphic. The state (1) supports the clade 14 with several reversals, in clade 10: to state (0) in *P. frontalis*, to state (2) in clade 12, to state (3) in clade 13; in clade 15: to state (2) in clade 16, to state (3) in clade 21, to state (2) in *A. jandaya* and to state (0) in *A. maculata*. The state (2) supports clade 12 and clade 21. The state (3) is found in *G. guarouba*, and clade 21 with reversal to state (2) in *A. jandaya* and to state (0) in *A. maculata*. The state (4) occurs in *P. frontalis*, clade 7, *P. finschi*, *P. euops* and *P. erythrogyens*. The state (5) is found in *P. leucophthalmus*.

Char71: The state (0) is the plesiomorphic. The state (1) occurs in *D. nobilis*, *P. frontatus*, *P. chloropterus*, *P. finschi*, *P. euops* and *P. erythrogyens*. The state (2) supports the clade 18. The state (3) is found in *G. guarouba* and *A. solstitialis*. The state (4) occurs in *A. maculata*.

Char72: The state (0) is the plesiomorphic. The state (1) supports the clade 18. The state (2) occurs in *G. guarouba* and *A. solstitialis*. The state (3) is found in *A. maculata*.

Char73: The state (0) is the plesiomorphic. The state (1) supports the clade 18, and the state (2) occurs in *A. weddellii*.

Char74: The state (0) is the plesiomorphic. The state (1) supports the clade 26 with a reversal to state (3) in clade 28. The state (2) occurs in *D. nobilis*, *T. acuticaudatus*, *O. manilata* and *P. maracana*. The state (3) supports the clade 14, with reversal to state (4) in *A. weddellii*, to state (2) in *P. maracana*, to state (4) in clade 20, to state (0) in *C. carolinensis*, and to state (1) in clade 26 with the exception of clade 28 that present state (3). The state (4) occurs in *A. weddellii*, and in clade 20 except for *C. carolinensis* that presents state (0).

Char75: The state (0) is the plesiomorphic. The state (1) supports clade 17 with the exception of *P. maracana* that presents state (2). The state (2) occurs in *P. maracana* and *O. manilata*. The state (3) is found in *G. guarouba*.

Char76: The state (0) is the plesiomorphic. The state (1) supports the clade 23. The state (3) occurs in clade 18. The state (4) is found in *P. frontalis* and *G. guarouba*.

Char77: The state (0) is the plesiomorphic. The state (1) occurs in *G. guarouba* and *A. solstitialis*. The state (2) supports clade 20 with reversal to state (0) in *C. carolinensis*, to state (1) in *A. solstitialis* and to state (3) in *A. maculata*. The state (4) supports the clade 18.

Char78: The state (0) is the plesiomorphic. The state (1) occurs in *P. euops*; clade 10 with reversal to state (2) in *L. branickii* and to state (5) in clade 13; *P. maracana* and *A. auricapillus*. The state (2) is found in *L. branickii* and clade 29. The state (3) occurs in clade 22 and *E. cactorum*. The state (4) is found in *T. acuticaudatus*. The state (5) supports clade 13 and clade 18.

Char79: The state (0) is the plesiomorphic. The state (1) occurs in *P. euops*, *P. mitratus*, clade 10 with reversal to state (2) in *L. branickii* and to state (5) in clade 13; *P. maracana* and *A. auricapillus*. The state (2) is found in *L. branickii* and clade 29. The state (3) occurs in clade 22 and *E. cactorum*. The state (4) in *T. acuticaudatus*. The state (5) supports clade 13 and clade 18.

Char80: The state (0) is the plesiomorphic. The state (1) supports clade 26. The state (2) occurs in *P. frontatus*, and in clade 8 with a reversal to state (0) in *P. finschi*. The state (3) is found in *A. nenday* and *A. solstitialis*. The state (4) supports the clade 22 with a reversal to state (3) in *A. solstitialis*. The state (5) occurs in *G. guarouba* and in clade 18.

Char81: The state (0) is the plesiomorphic. The state (1) occurs in *D. nobilis*, clade 4, clade 12, and clade 17 with a reversal to state (4) in clade 18. The state (2) supports the clade 14 with reversal to state (1) in clade 17, to state (4) in clade 18, to state (3) in clade 24. The state (3) supports the clade 24. The state (5) is found in *C. carolinensis*.

Char82: The state (0) is the plesiomorphic. The state (1) occurs in clade 4, clade 12 and *P. maracana*. The state (2) supports clade 14 with reversal to state (1) in *P. maracana*, to state (4) in clade 18, to state (5) in *C. carolinensis*, to state (6) in clade 23 and to state (3) in clade 24. The

state (3) supports clade 24. The state (4) supports clade 18. The state (5) is found in *C. carolinensis*. The state (6) supports clade 23.

Char83: The state (0) is the plesiomorphic. The state (1) supports the clade 14 with reversal to state (0) in clade 16, *P. maracana* and *C. carolinensis*; to state (2) in *C. spixii* and to state (3) in *A. ararauna*.

Char84: The state (0) is the plesiomorphic. The state (1) is found in clade 4 and *C. carolinensis*. The state (2) supports clade 14 with reversal to state (4) in clade 17, to state (1) in *C. carolinensis* and to state (3) in clade 24. The character (3) supports clade 24. The state (4) supports clade 17.

Char85: The state (1) is the plesiomorphic. The state (0) supports the clade 15, with reversal to state (3) in clade 17 and in *C. carolinensis*. The state (2) supports clade 4. The state (3) occurs in *D. nobilis*, *O. manilata*, clade 17 and *C. carolinensis*. The state (4) supports the clade 10 with reversal to state (3) in *O. manilata*.

Conclusões gerais

Uma grande vantagem dos métodos morfológicos é a aplicabilidade aos espécimes preservados em museus (Vogt *et al.* 2010), em particular para espécies raras, extintas (como *P. maugeri* e *C. carolinensis*) ou representadas apenas pelo tipo/holótipo, que geralmente tem centenas de anos (Hillis, 1987; Wilson 1992; Donoghue & Alverson 2000). Além disso, caracteres morfológicos podem ser aplicados a um grande número de espécimes de cada espécie analisada, provenientes de varias localidades dentro da área de distribuição, permitindo uma melhor compreensão da variação intra e interespecífica.

No presente estudo apresentamos pela primeira vez uma revisão taxonômica completa e uma hipótese filogenética para o gênero *Aratinga* sensu Peters (1937) com base em caracteres osteológicos e de plumagem. Após a revisão taxonômica, 37 táxons, em contraste com as 21 espécies anteriormente reconhecidas, foram considerados espécies filogenéticas sem ambiguidade e usados como táxons terminais na análise filogenética. Além disso, com base na morfologia, o gênero *Aratinga* sensu Peters (1937) foi dividido em quatro gêneros distintos, *Aratinga*, *Eupsittula*, *Thectocercus* e *Psittacara*. A análise com base unicamente em caracteres osteológicos não permitiu recuperar as relações entre os quatro gêneros propostos após a revisão taxonômica, provavelmente devido à baixa variação osteológica interespecífica e presença de caracteres polimórficos. Geralmente, caracteres osteológicos produzem uma melhor resolução em análises no nível de família ou acima (Omland & Lanyon 2000). Por outro lado, a análise com base unicamente em caracteres de plumagem resultou em uma resolução um pouco melhor, recuperando o monofiletismo de *Eupsittula*. Por fim, a combinação de conjuntos de dados melhorou a resolução, apesar do grande número de táxons terminais, recuperando o monofiletismo de *Thectocercus* e *Eupsittula* e confirmando a próxima relação de *C. carolinensis* com o gênero *Aratinga*. No geral, como sugerido pela revisão taxonômica e por estudos moleculares, os caracteres morfológicos não suportaram o monofiletismo do gênero *Aratinga* sensu Peters (1937) e evidenciaram uma grande variação interespecífica na plumagem, que resultou em vários caracteres homoplásticos.

O próximo passo será combinar dados morfológicos e moleculares para todos os táxons terminais, uma vez que esta combinação frequentemente produz resultados que são mais úteis do que os estudos separados (Sites *et al.* 1996; Baker *et al.* 1998; Wiens 2004; O'Leary & Gatesy

2008), para descobrir se a resolução em nível de espécie melhoraria e se a variação de plumagem é suportada por diferenças genotípicas.

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General abstract

The genus *Aratinga* Spix, 1824 traditionally includes 21 species of neotropical parakeets that range from Central to the extreme South of America, characterized by long, pointed tail and mostly green plumage. Several authors have questioned the monophyly of the genus mainly based on results of molecular studies. Silveira *et al.* (2005) and Remsen *et al.* (2013) first suggested a splitting of the genus based on plumage analysis. This study proposes, for the first time, a complete taxonomic revision and a phylogenetic hypothesis for the genus *Aratinga* based on osteological and plumage characters. Moreover, resulting phylogenetic hypotheses based on morphology were compared with molecular studies findings. Based on the analysis of morphology, 37 taxa, in opposition to the 21 traditionally recognized, could be unambiguously diagnosed and were used as terminal taxa in the phylogenetic analysis. The genus *Aratinga* sensu Peters (1937) was split into four distinct genera: *Aratinga*, *Eupsittula*, *Thectocercus* and *Psittacara*. Osteological characters alone failed to recover the relationships among the four genera proposed after the taxonomic revision, whereas plumage characters resulted in a slightly better resolution, recovering the monophyly of *Eupsittula*. Combining datasets improved resolution, recovering the monophyly of *Thectocercus* and *Eupsittula*, and confirming the close relationship of *C. carolinensis* with the genus *Aratinga*. Overall, as suggested by the taxonomic revision and molecular studies, morphological characters do not support the monophyly of the genus.

Resumo geral

O gênero *Aratinga* Spix, 1824 tradicionalmente inclui 21 espécies de periquitos neotropicais que ocorrem desde o Centro até o extremo Sul da América, caracterizados por cauda comprida, pontiaguda e plumagem predominantemente verde. Vários autores têm questionado o monofiletismo do gênero primariamente com base nos resultados de estudos moleculares. Silveira *et al.* (2005) e Remsen *et al.* (2013) foram os primeiros a sugerir uma divisão do gênero baseada na análise de plumagem. No presente estudo apresentamos pela primeira vez uma revisão taxonômica completa e uma hipótese filogenética para o gênero *Aratinga* sensu Peters (1937) com base em caracteres osteológicos e de plumagem. Além disso, as hipóteses filogenéticas com base na morfologia foram comparadas com os resultados dos estudos moleculares. Após a revisão taxonômica, 37 taxóns, em contraste com as 21 espécies anteriormente reconhecidas, foram considerados espécies filogenéticas sem ambiguidade e usados como táxons terminais na análise filogenética. O gênero *Aratinga* sensu Peters (1937), com base na morfologia, foi dividido em quatro gêneros distintos, *Aratinga*, *Eupsittula*, *Thectocercus* e *Psittacara*. A análise filogenética com base em caracteres unicamente osteológicos não conseguiu recuperar as relações entre os quatro gêneros propostos após a revisão taxonômica, enquanto a análise com caracteres de plumagem resultou em uma resolução um pouco melhor, recuperando o monofiletismo de *Eupsittula*. Por fim, a combinação de conjuntos de dados melhorou a resolução, recuperando o monofiletismo de *Thectocercus* e *Eupsittula* e confirmando a relação próxima de *C. carolinensis* com o gênero *Aratinga*. No geral, tal como sugerido pela revisão taxonômica e por estudos moleculares, os caracteres morfológicos não suportam o monofiletismo do gênero.