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ARTICLE

Characterization of insect galls from a vegetation area in Altinópolis, São Paulo State, Brazil

Amanda das Neves Ribeiro[1,4]; Maria Isabel Protti de Andrade Balbi[2] & Maria Virginia Urso-Guimarães[1,3,5]

[1] Universidade Federal de São Carlos (UFSCAR), Centro de Ciências Humanas e Biológicas (CCHB), Departamento de Biologia (DBio), Laboratório de Sistemática de Diptera. Sorocaba, SP, Brasil.
[2] Universidade de São Paulo (USP), Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto (FFCLRP), Departamento de Biologia, Laboratório de Morfologia e Evolução de Diptera (LMED). Ribeirão Preto, SP, Brasil. ORCID: http://orcid.org/0000-0001-6092-3462. E-mail: mariaisabel.balbi@gmail.com
[3] Universidade de São Paulo (USP), Museu de Zoologia (MZUSP). São Paulo, SP, Brasil.
[4] ORCID: http://orcid.org/0000-0002-5970-6505. E-mail: amanda_nribeiro@hotmail.com
[5] ORCID: http://orcid.org/0000-0003-3657-9379. E-mail: mvirginiaurso@gmail.com

Abstract. Herein, we studied the occurrence of insect galls from natural vegetation around the Itambé Cave, Altinópolis, SP, Brazil. A sampling effort of 7.5 hours resulted in 41 gall morphotypes on 21 host plant species from 14 families. The richest families of host plants in morphotypes were Fabaceae (N = 11), Euphorbiaceae (N = 7), and Malpighiaceae (N = 5). *Copaifera langsdorffii* Desf. (N = 8), *Croton floribundus* Spreng. (N = 7), *Diplopterys pubipetala* (A. Juss.) W.R. Anderson & C.C. Davis (N = 5), and *Bauhinia holophylla* (Bong.) Steud. (N = 4) were the super host plant species. Among the gall makers obtained, cecidomyiids were reared in 81% of cases and Hemiptera (Diaspididae), Hymenoptera (Eurytomidae), Coleoptera (*Apion* sp./ Apionidae), and Lepidoptera in 4.5% of cases, each. The parasitoids belong to the Chalcidoidea superfamily (Hymenoptera). One new species of *Camptoneuromyiia* (Cecidomyiidae) was found in *Smilax oblongifolia* Pohl ex Griseb. (Smilacaceae) as inquiline and a new species of *Lestodiplosis* in *Diplopterys pubipetala* (Malpighiaceae) was a predator. We also present the first register of *Bauhinia holophylla* as host plants of Cecidomyiidae. We also present the first register of *Bauhinia holophylla* as host plants of Cecidomyiidae, and we expand the occurrence of *Rochadiplosis tibouchinae* Tavares, *Lopesia spinosa* Maia and *Couridiplosis vena* Maia to São Paulo State. The results of this paper are a continuation of the description of gall morphotypes from the vegetation in Northeastern São Paulo State, and they also increase knowledge about the diversity of host plant and gall-maker associations in the Neotropical region.

Key-Words. Biodiversity; Gall maker; Neotropical region; Northeastern São Paulo State; Plant-insect interaction.

INTRODUCTION

Galls are vegetal structures produced by an abnormal increase of plant cells, tissues or organs in response to specific stimulation caused by an inductor agent, such as a virus, bacteria, nematodes or insects (Carneiro *et al.,* 2009; Shorthouse *et al.,* 2005; Shorthouse & Rohfritsch, 1992). Manipulation of the host plant can be so strong that the inducer assumes control of the gall tissue's chemical composition, which is frequently quite different from the ungalled tissue (Scareli-Santos, 2001). It also involves two counteracting events: the insect stresses the host organ, and the host counters it with newly differentiated tissues and new physiological activities (Raman, 2007). Some authors affirm the high level of specificity of gall maker and host plant (species-specific) associations as a result of the interaction between two genotypes (Abrahamson & McCrea, 1986; Abrahamson & Weis, 1987; Stone & Schönrogge, 2003). Galls can be induced in any vegetal organ, but the highest frequency and diversity is found in leaves (Mani, 1964). Each inducer species produces galls that are anatomically and physiologically different from those induced by other related species (Stone & Schönrogge, 2003). In this study we describe qualitatively the insect gall morphotypes found in an area of Semideciduous Seasonal Forest in Altinópolis, which is a continuation of the description of gall morphotypes richness in the vegetation from Northeastern São Paulo State, Brazil (Saito & Urso-Guimarães, 2012; Urso-Guimarães & Scareli-Santos, 2006). The Semideciduous Seasonal Forest is an Atlantic Forest phytophysiognomy that is considered a priority area for conservation, due to its great biological richness and the degradation it has suffered in recent years (Martins *et al.,* 2003). Currently, the vegetation is disturbed by anthropic action, mainly around the Itambé Cave.

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MATERIAL AND METHODS

Studied area

The samples were carried out in the Itambé Touristic Complex area, located in Altinópolis, State of São Paulo, Brazil (47°23.0'W, 21°00.7'S, about 900 m altitude) (Fig. 1A). The Itambé Touristic Complex has an area of approximately 1.2 km^2 and includes two main attractions, the Itambé Cave and the Itambé Waterfall. Altinópolis presents Cwa climate (Köppen, 1948) and the vegetation is a mosaic of Riparian Forest, Seasonal Semideciduous Forest, and Cerrado phytophysiognomies, predominated by Seasonal Semideciduous Forest (Ponzoni & Moreira-Pessôa, 2015).

Sampling and analysis of the material

Five samplings were carried out in the area from March 2000 to August 2002 (15.iii.2000, 02.viii.2000, 04.x.2000, 28.v.2001, 12.viii.2002). Each sample consisted of an hour and a half walk on a 1.5 km trail, with a total sampling effort of 7.5 hours. To compare the similarity of the morphotypes in the host plant species found in Altinópolis and those from other areas of São Paulo State (Luiz Antônio, Santa Rita do Passa Quatro, and Sorocaba) we performed a binary similarity analysis using the Sorensen Similarity Coefficient (Ss = 2a / 2a + b + c, where a = total number of species in samples A and B, b = number of species present in sample B, but not in A, c = number of species present in sample A, but not in B). The branches of host plants with galls were collected, photographed; some galls were dissected to obtain immature, and other galls were placed in plastic pots to rear the adult forms of gall makers and associated fauna. All insects were preserved in 70% alcohol. The cecidomyiids were later mounted on microscope slides following the methodology outlined in Gagné (1994) and identified to genera based on the keys of Gagné (1994). After identifying the cecidomyiid genus, the obtained specimens (immature and/or adults) were compared to

Figure 1. Aerial map of study area in Altinópolis, São Paulo State, Brazil. In the right corner, a map of Altinópolis in light green with the neighboring municipalities in grey, and in the upper right corner, Altinópolis' location in the State of São Paulo (Sources: IBGE and CNES/Airbus. Digital Globe/Google).

Table 1. Characterization of insect galls recorded in Altinópolis, Northeastern São Paulo State, Brazil by host plant. Figures refer to gall morphotype's picture.

Host family	Host species	Organ	Shape	Color	Pubescence	Occurrence	Gall maker	Associated fauna	Figures
Anacardiaceae	*Tapirira guianensis* Aubl.	Leaf	Globoid	Green	No	unilocular	Diptera (Cecidomyiidae, Cecidomyiinae, Cecidomyiidi)	—	2a
Asteraceae	*Praxelis pauciflora* (Kunth) R.M. King & H. Rob.	Leaf	Amorphous	Green	Yes	unilocular	empty gall	—	—
Asteraceae	*Moquiniastrum pulchrum* (Cabrera) G. Sancho	Leaf bud	Amorphous	Light yellow	Yes	unilocular	Diptera (Cecidomyiidae, Cecidomyiinae, Cecidomyiini, Gen. nov., sp. nov.)	Hymenoptera (Eulophidae, Pteromalidae, Torymidae)	2b
Asteraceae	*Moquiniastrum pulchrum*	Leaf/Stem	Globoid	Light yellow	Yes	unilocular	Diptera (Cecidomyiidae, Cecidomyiinae, Cecidomyiidi)	—	2c
Bignoniaceae	*Amphilophium elongatum* (Vahl) L.G. Lohmann	Tendril/Leaf midvein/Stem	Fusiform	Green	No	unilocular	empty gall	—	2d
Caryocaraceae	*Caryocar brasiliense Cambess.*	Leaf	Lenticular	Brown	Yes	unilocular	Hemiptera (Diaspididae)	Hymenoptera (Encyrtidae)	2e
Chrysobalanaceae	*Couepia grandiflora* (Mart. & Zucc.) Benth.	Leaf	Lenticular	Brown	Yes	unilocular	Diptera (Cecidomyiidae, Cecidomyiinae, Cecidomyiidi)	—	2f
Euphorbiaceae	*Croton floribundus Spreng.*	Leaf	Cylindrical	Brown	Yes	unilocular	Diptera (Cecidomyiidae, Cecidomyiinae, Lopesiini, *Lopesia spinosa* Maia)	—	2g, 2h
Euphorbiaceae	*Croton floribundus*	Leaf	Lenticular	Brown	No	unilocular	Diptera (Cecidomyiidae/Cecidomyiinae)	—	2i
Euphorbiaceae	*Croton floribundus*	Leaf	Globoid hollow	Light yellow	Yes	unilocular	Diptera (Cecidomyiidae/Cecidomyiinae)	—	2j
Euphorbiaceae	*Croton floribundus*	Leaf	Globoid filled	Light yellow	Yes	unilocular	Diptera (Cecidomyiidae/Cecidomyiinae)	—	2k
Euphorbiaceae	*Croton floribundus*	Leaf vein	Fusiform	Light yellow/Green	Yes	unilocular	Diptera (Cecidomyiidae, Alycaulini, *Couridiplosis vena* Maia)	—	2l
Euphorbiaceae	*Croton floribundus*	Stem	Globoid	Brown	No	unilocular	Coleoptera (Apioninae, *Apion* sp.)	—	3a
Euphorbiaceae	*Croton floribundus*	Stem	Fusiform	Brown	No	unilocular	Lepidoptera	—	—
Fabaceae	*Bauhinia holophylla (Bong.) Steud.*	Leaf	Conical	Light yellow/Red	Yes	unilocular	Diptera (Cecidomyiidae, Cecidomyiinae, Lasiopteridi)	Hymenoptera (Rileynae/Eurytomidae)	3b, 3c
Fabaceae	*Bauhinia holophylla*	Leaf	Globoid	Brown	No	unilocular	empty gall	—	—
Fabaceae	*Bauhinia holophylla*	Stem	Fusiform	Brown	No	plurilocular	empty gall	—	3d
Fabaceae	*Copaifera langsdorffii* Desf.	Leaf	Convex	Red	No	unilocular	empty gall	—	3e
Fabaceae	*Copaifera langsdorffii*	Leaf	Globoid	Brown	No	unilocular	empty gall	—	3f
Fabaceae	*Copaifera langsdorffii*	Leaf	Globoid	Orange/Red/Brown	Yes	unilocular	empty gall	—	3g
Fabaceae	*Copaifera langsdorffii*	Leaf	Lenticular	Light yellow	No	unilocular	empty gall	—	3h
Fabaceae	*Copaifera langsdorffii*	Leaf	Triangular	Brown	No	unilocular	empty gall	—	3i
Fabaceae	*Copaifera langsdorffii*	Leaf	Globoid	Red	No	unilocular	empty gall	—	3j
Fabaceae	*Copaifera langsdorffii*	Leaf	Cylindrical	Brown	No	unilocular	empty gall	—	3k
Fabaceae	*Copaifera langsdorffii*	Stem	Globoid	Brown	No	plurilocular	Hymenoptera (Eulophidae)	—	3l
Lauraceae	*Nectandra* sp.	Leaf	Lenticular	Green	No	unilocular	Diptera (Cecidomyiidae/Cecidomyiinae)	—	4a
Lauraceae	*Ocotea* sp.	Leaf	Cylindrical	Brown	No	unilocular	empty gall	—	4b
Malpighiaceae	*Diplopterys pubipetala* (A. Juss.) W.R. Anderson & C.C. Davis	Leaf	Conical	Green/Brown	No	unilocular	Diptera (Cecidomyiidae, Cecidomyiinae, Clinodiplosini, *Clinodiplosis bellum* Urso-Guimarães & Carmo-Neto)	Hymenoptera (Eulophinae, Entedoninae (Eulophidae), Torymidae)	4c
Malpighiaceae	*Diplopterys pubipetala*	Leaf	Lenticular	Green	Yes	unilocular	Diptera (Cecidomyiidae, Cecidomyiinae, Dasineurini, *Dasineura* sp.)	Diptera (Cecidomyiidae, Cecidomyiinae, Lestodiplosini, *Lestodiplosis* sp.)	4c
Malpighiaceae	*Diplopterys pubipetala*	Leaf	Lenticular	Yellow/Green/Brown	No	unilocular	empty gall	—	4d
Malpighiaceae	*Diplopterys pubipetala*	Leaf bud	Globoid	Brown	No	unilocular	empty gall	—	4e
Malpighiaceae	*Diplopterys pubipetala*	Stem	Fusiform	Brown	No	unilocular	empty gall	—	—
Melastomataceae	*Miconia stenostachya* DC.	Leaf	Globoid	Light yellow	Yes	unilocular	empty gall	—	4f
Melastomataceae	*Tibouchina* sp.	Leaf	Globoid	Green	Yes	unilocular	Diptera (Cecidomyiidae, Cecidomyiinae, Lopesiini, *Rochadiplosis tibouchinae* Tavares)	Hymenoptera (Perilampidae)	4g
Meliaceae	*Guarea guidonia* (L.) Sleumer	Leaf midvein	Fusiform	Green	No	unilocular	Diptera (Cecidomyiidae/Cecidomyiinae)	—	4h
Myrtaceae	*Myrcia bella* Cambess.	Leaf	Amorphous	Green	No	plurilocular	Hymenoptera (Eurytomidae)	—	4i
Myrtaceae	*Eugenia punicifolia* (Kunth) DC.	Leaf	Lenticular	Black	No	unilocular	empty gall	—	4j
Myrtaceae	*Eugenia speciosa* Cambess.	Leaf	Cylindrical with apical projection	Light yellow	No	unilocular	Diptera (Cecidomyiidae/Cecidomyiinae)	—	4k
Myrtaceae	Myrtaceae sp.	Leaf	Globoid	Green	No	unilocular	empty gall	—	4l
Sapindaceae	*Serjania reticulata* Cambess.	Leaf	Lenticular	Green/Brown	Yes	unilocular	Diptera (Cecidomyiidae/Cecidomyiinae)	—	4 m
Smilacaceae	*Smilax oblongifolia* Pohl ex Griseb.	Leaf	Globoid	Green	No	unilocular	Diptera (Cecidomyiidae, Cecidomyiinae, Alycaulini, *Alycaulus hexadentatus* Urso-Guimarães)	Hymenoptera (Eulophidae); Diptera (Cecidomyiidae, Cecidomyiinae, Camptoneuromyiini *Camptoneuromyia* sp.)	4n

the original descriptions of Brazilian species from the genus. Other insects were sent to and identified by the specialists indicated in the acknowledgements. The nomenclature of galls follows Isaias *et al.* (2013). The exsiccates of host plants with fertile material are deposited in the Herbarium of FFCLRP/USP. The insects and galls are deposited in the Laboratório de Sistemática de Diptera/ UFSCar.

RESULTS AND DISCUSSION

We found forty-one gall morphotypes on 21 host plant species from 14 different families. The morphotypes were obtained mostly from leaves (85%) followed by stems (15%), leaf buds (5%), and tendrils (3%). Our results corroborate other surveys conducted in drier environments (Mani, 1964; Maia, 2001; Urso-Guimarães *et al.*,

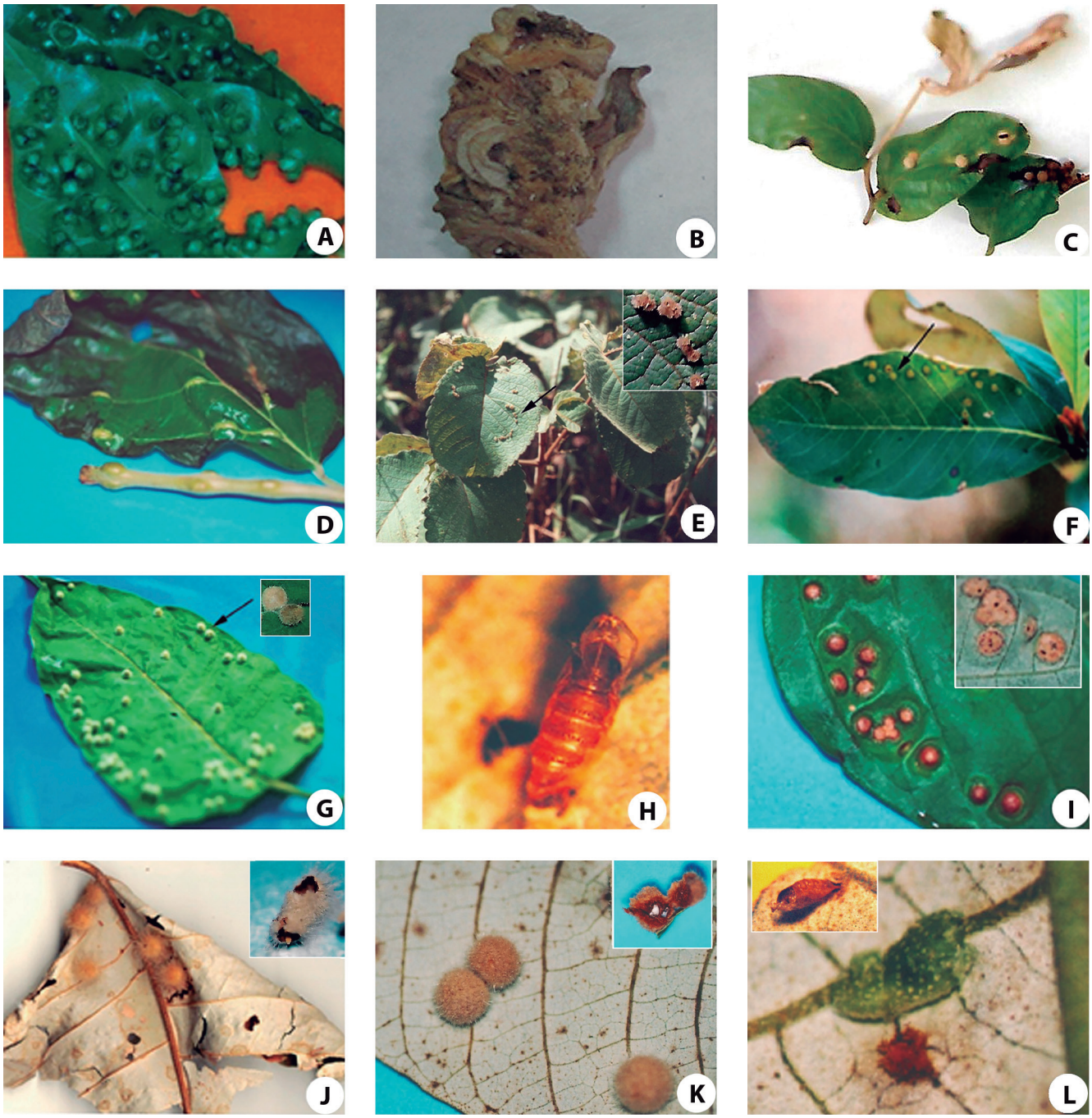

Figure 2. Gall morphotypes in host plants from Altinópolis, São Paulo State, Brazil, (A) Leaf gall of *Tapirira guianensis* (Anacardiaceae); (B) Bud leaf convolute in a complex gall of *Moquiniastrum pulchrum* (Asteraceae); (C) Leaf gall of *Moquiniastrum pulchrum* (Asteraceae); (D) Leaf gall of *Amphilophium elongatum* (Bignoniaceae), arrow on gall; (E) Leaf gall of *Caryocar brasiliense* (Caryocaraceae), galls in higher magnification in the upper right corner; (F) Leaf gall of *Couepia grandiflora* (Chrysobalanaceae), arrow on gall; (G) Cylindrical leaf gall with star trichomes of *Croton floribundus* (Euphorbiaceae), galls in higher magnification in the upper right corner; (H) Exuvia of Cecidomyiidae emerging from previous gall; (I) Adaxial surface of lenticular leaf gall of *Croton floribundus* (Euphorbiaceae), galls in abaxial surface in the upper right corner; (J) Hollow globoid leaf gall with long trichomes of *Croton floribundus* (Euphorbiaceae), gall opened, with a larva in higher magnification in the upper right corner; (K) Filled globoid leaf gall of *Croton floribundus* (Euphorbiaceae); gall opened, with fungus associated in higher magnification in the upper right corner; (L) Leaf vein gall of *Croton floribundus* (Euphorbiaceae), exuvia leaving the gall in the upper left corner. (Pictures: Urso-Guimarães, M.V.).

2003; Fernandes & Negreiros, 2006; Maia *et al.*, 2008) including those from Northeastern São Paulo State, Brazil (Urso-Guimarães & Scareli-Santos, 2006; Saito & Urso-Guimarães, 2012) where the percentage of leaf galls ranges from 75% to 90%. The most frequent shape of galls was globoid (37%) followed by lenticular (25%), fusiform (15%), cylindrical and amorphous (7% each), conical (5%), and convex and triangular (2.5% each). The most frequently sampled gall colors were brown (46%) and green (34%), followed by light yellow (22%), red (10%), black and yellow (2.5% each). In relation to the indumentum and internal chambers, most galls were glabrous (64%) and unilocular (93%) (for detailed discussion about presence/absence of trichomes, see Saito & Urso-Guimarães, 2012). Table 1 presents a detailed morphological description of the collected galls, and associated fauna from the samples. Plates with morphotypes are presented in Figs. 2A-L, 3A-L, 4A-N.

In descending order, gall morphotypes appeared in Fabaceae (N = 11), followed by Euphorbiaceae (N = 7),

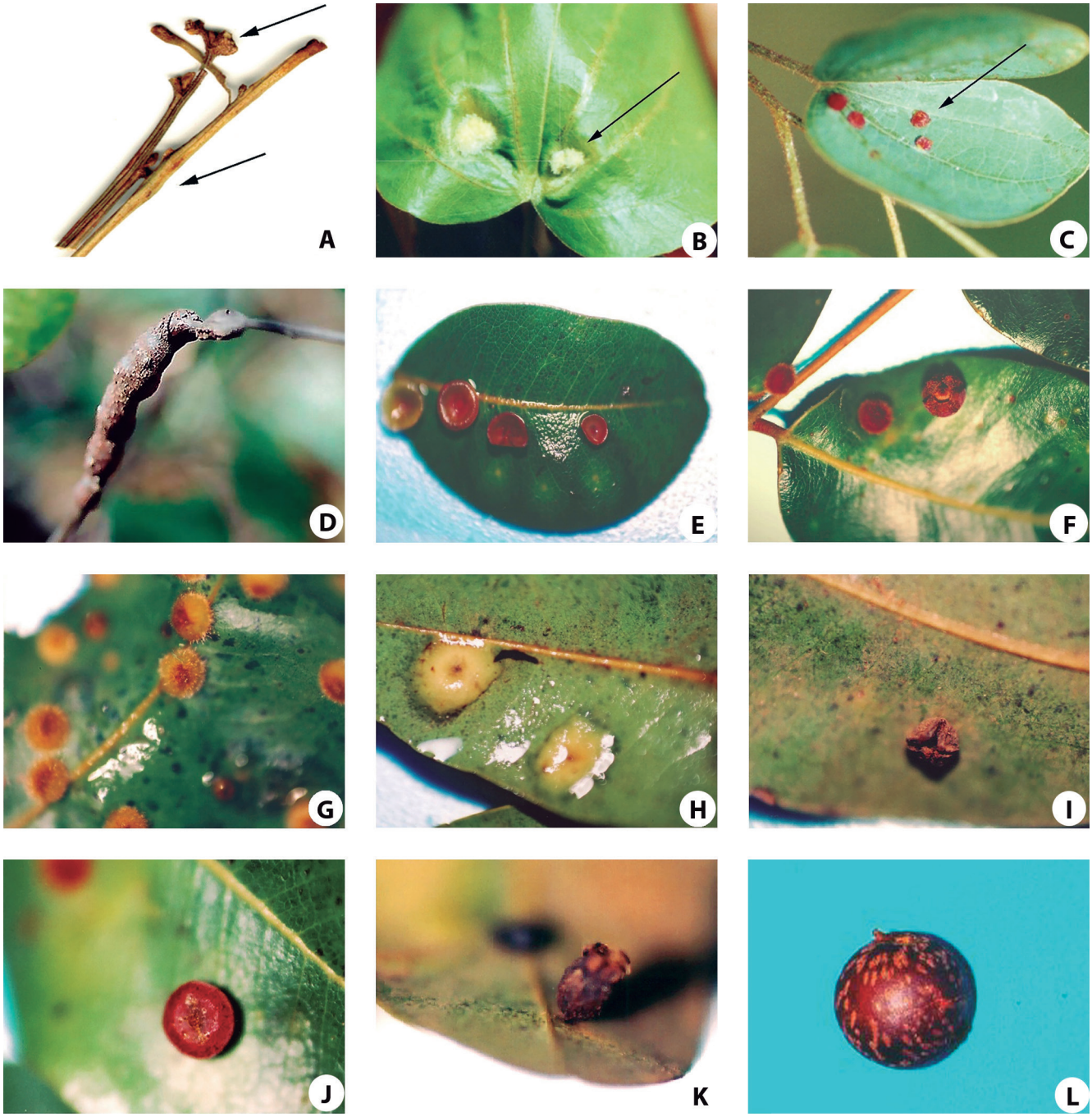

Figure 3. Gall morphotypes in host plants from Altinópolis, São Paulo State, Brazil. (A) Globoid and fusiform stem galls of *Croton floribundus* (Euphorbiaceae), arrow on both galls; (B) Immature leaf gall of *Bauhinia holophylla* (Fabaceae), arrow on gall; (C) Mature leaf gall of *Bauhinia holophylla* (Fabaceae), arrow on gall; (D) Stem gall of *Bauhinia holophylla* (Fabaceae); (E) Convex leaf gall of *Copaifera langsdorffii* (Fabaceae); (F) Globoid glabrous leaf gall of *Copaifera langsdorffii* (Fabaceae); (G) Globoid leaf gall with red and orange trichomes of *Copaifera langsdorffii* (Fabaceae); (H) Lenticular leaf gall of *Copaifera langsdorffii* (Fabaceae); (I) Triangular leaf gall of *Copaifera langsdorffii* (Fabaceae); (J) Globoid red leaf gall of *Copaifera langsdorffii* (Fabaceae); (K) Cylindrical leaf gall of *Copaifera langsdorffii* (Fabaceae); (L) Globoid stem gall of *Copaifera langsdorffii* (Fabaceae). (Pictures: Urso-Guimarães, M.V.).

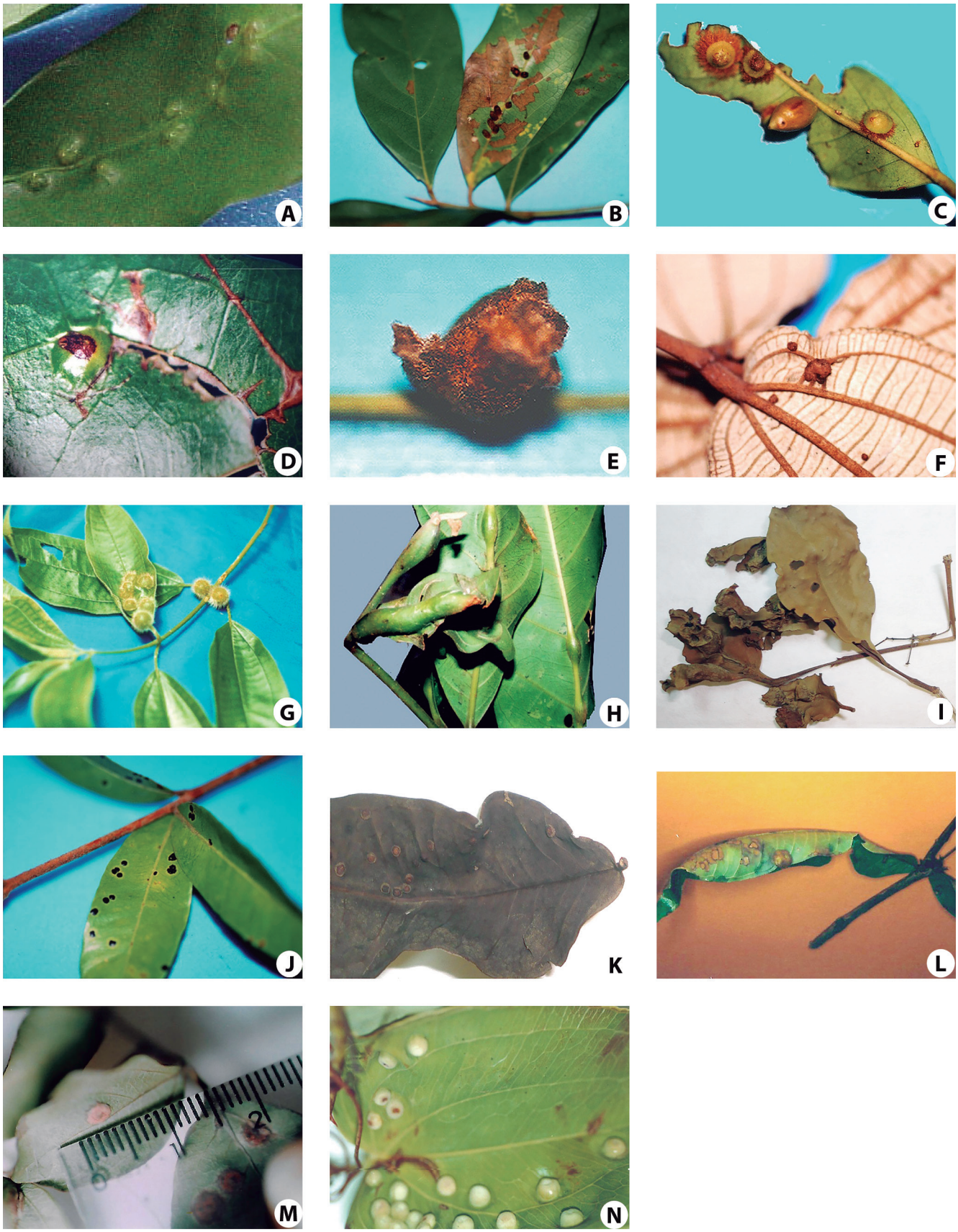

Figure 4. Gall morphotypes in host plants from Altinópolis, São Paulo State, Brazil. (A) Leaf gall of *Nectandra* sp. (Lauraceae); (B) Leaf gall *Ocotea* sp. (Lauraceae); (C) Cylindrical and lenticular hairy leaf galls of *Diplopterys pubipetala* (Malpighiaceae); (D) Lenticular leaf gall of *Diplopterys pubipetala* (Malpighiaceae); (E) Bud leaf gall of *Diplopterys pubipetala* (Malpighiaceae); (F) Leaf gall of *Miconia stenostachya* (Melastomataceae); (G) Leaf hairy gall of *Tibouchina* sp. (Melastomataceae); (H) Leaf gall of *Guarea guidonea* (Meliaceae); (I) Leaf gall of *Myrcia bella* (Myrtaceae); (J) Leaf gall of *Eugenia punicifolia* (Myrtaceae), arrow on gall; (K) Leaf gall of *Eugenia speciosa* (Myrtaceae), arrow on gall; (L) Leaf gall of Myrtaceae sp., arrow on gall; (M) Leaf gall of *Serjania reticulata* (Sapindaceae); (N) Leaf gall of *Smilax oblongifolia* (Smilacaceae). (Pictures: Urso-Guimarães, M.V.).

Malpighiaceae (N = 5), Myrtaceae (N = 4), Asteraceae (N = 3), Lauraceae and Melastomataceae (N = 2). Information about morphotype richness of other families and species is given in Table 2. Our results indicated that the richer the host family, the richer their gall morphotypes, corroborating data previously obtained in the Neotropical region (Gagné, 1994; Araújo, 2011; Santana & Isaias, 2014). However, it's important to highlight that of the 41 morphotypes sampled, 23 were found in the four host plant species: *Copaifera langsdorffii, Croton floribundus, Diplopterys pubipetalum,* and *Bauhinia holophylla,* with eight, seven, five and three morphotypes, respectively. Plants are referred to as super host plants when a single species presents a high number of different gall morphotypes caused by distinct inducers (Veldtman & McGeoch, 2003) and also increases the number of morphotypes per family as related by Araújo (2011).

Prior to this study, only four surveys have been performed in areas with Seasonal Semideciduous Forest (SSF):, Maringá/PR (Carvalho *et al.,* 2015), Goiânia/GO (Santos *et al.,* 2010), Serra da Bodoquena/MS (Urso-Guimarães *et al.,* 2017), and Sorocaba/SP (Ansaloni *et al.,* 2018), which were compared to Altinópolis (this study). Table 3 shows the compared richness of gall morphotypes in these areas, as well as from nearby areas of Cerrado vegetation from Northeastern São Paulo State. The average 1.95 morphotypes per plant species in Altinópolis is comparable to the average found in other dry environments (see also Table 3 in Urso-Guimarães *et al.,* 2017) and is higher than those found in areas with the same vegetation in Goiânia/GO (1.7), Serra da Bodoquena/MS (1.6), and Maringá/PR (1.2). This average is only comparable to the Seasonal Semideciduous Forest area in Sorocaba in Southeastern São Paulo State (2.1), where the sampling effort was 48 hours and it is higher than the Cerrado areas in Luiz Antônio (1.7) and Santa Rita do Passa Quatro (1.4), both nearby areas in the State of São Paulo.

Comparing morphotypes of the host plant species found in Altinópolis with those from other areas, we found low similarity among them, with the Sorensen Coefficient (Ss) varying from 0.01 to 0.28 (Table 4). The highest similarity was found between Altinópolis (SSF) and Santa Rita do Passa Quatro (Cerrado Pé-de-Gigante) with Ss = 0.28, even though they have different phytophysiognomies and are not the closest areas (122 km). Two factors influenced such result, the first was the presence of eleven similar gall morphotypes in eight host plant species with wide distribution, which are *Amphilophium elongatum* (Vahl) L.G. Lohmann, *Caryocar brasiliense* Cambess, *Copaifera langsdorffii* Desf., *Diplopterys pubipetala* (A. Juss.) W.R. Anderson & C.C. Davis, *Miconia stenostachya* DC., *Moquiniastrum pulchrum* (Cabrera) G. Sancho, *Myrcia bella* Cambess, and *Tapirira guianensis* Aubl.; the second factor was the presence of three super host plant species, *Copaifera langsdorffii, Diplopterys pubipetala,* and *Moquiniastrum pulchrum,* responsible for six of the eleven similar gall morphotypes.

Of the associated gall fauna from Altinópolis, we recorded eighteen species of Diptera (Cecidomyiidae) (81.8%), two species of Hymenoptera (Eulophidae and Eurytomidae) (9.1%), and one species of Hemiptera

Table 2. Richness of gall morphotypes in plant host family and species from vegetation around Itambé Cave, Altinópolis, São Paulo State, Brazil.

Host Plant Families (N = 14)	Number of species (N = 21)	Gall Morphotypes (N = 41)
Fabaceae	2	11
Euphorbiaceae	1	7
Malpighiaceae	1	5
Myrtaceae	4	4
Asteraceae	2	3
Lauraceae	2	2
Melastomataceae	2	2
Anacardiaceae	1	1
Bignoniaceae	1	1
Caryocaraceae	1	1
Chrysobalanaceae	1	1
Meliaceae	1	1
Sapindaceae	1	1
Smilacaceae	1	1

Table 4. Sorensen Similarity Coefficient (Ss) comparing Altinópolis gall morphotypes per host plant species from Semideciduous Seasonal Forest (SSF) in the States of Mato Grosso do Sul and Southeastern São Paulo and with Cerrado in Northeastern São Paulo State.

Locality	Ss
Altinópolis X Santa Rita do Passa Quatro (Urso-Guimarães & Scareli-Santos, 2006)	0,28
Altinópolis x Sorocaba (Ansaloni *et al.,* 2018)	0,15
Altinópolis X Luiz Antônio (Saito & Urso-Guimarães, 2012)	0,10
Altinópolis x Serra da Bodoquena, MS (Urso-Guimarães *et al.,* 2017)	0,01

Table 3. Richness of gall morphotypes from localities with Seasonal Semideciduous Forest and Cerrado phytophysiognomies in Northeastern São Paulo State.

Locality	Richness of gall morphotypes	Richness of host plant species	Average number of gall/host plant species	Total sampling effort
Sorocaba, SP (Ansaloni *et al.,* 2018)	113	54	2.1	48h
Altinópolis, SP (this study)	41	21	1.95	7.5h
Estação Ecológica do Jataí, Luiz Antônio, SP (Saito & Urso-Guimarães, 2012)	69	41	1.7	15h
Goiás, GO (Santos *et al.,* 2010)	34	20	1.7	not informed
Serra da Bodoquena, MS (Urso-Guimarães *et al.,* 2017)	65	39	1.6	2h
Santa Rita do Passa Quatro, SP (Urso-Guimarães & Scareli-Santos, 2006)	35	25	1.4	not informed
Maringá, PR (Carvalho *et al.,* 2015)*	40	35	1.2	not informed

* In Carvalho *et al.,* 2015 were not identified all morphospecies and morphotypes are not characterized, even so we chose to include these data because it is one of the few works in the area of Seasonal Semideciduous Forest phytophysiognomy.

(Diaspididae), Coleoptera (*Apion* sp./Apionidae) and Lepidoptera (4.5% each).

Of the eighteen species of cecidomyiids found, five species were known: *Rochadiplosis tibouchinae* Tavares associated with *Tibouchina* sp. (Tavares, 1917) from Rio de Janeiro State (Tavares, 1917), and *Lopesia spinosa* Maia and *Couridiplosis vena* Maia associated with *Croton floribundus* (Euphorbiaceae) from Minas Gerais State (Maia & Fernandes, 2004), and *Clinodiplosis bellum* Urso-Guimarães and Carmo-Neto found in conical leaf galls of *Diplopterys pubipetala* (Urso-Guimarães & Carmo-Neto, 2015) and *Alycaulus hexadentatus* found on leaf galls in *Smilax oblongifolia* Pohl ex Grisebach (Smilacaceae) in Altinópolis/São Paulo State (Urso-Guimarães, 2018). The other thirteen species of Cecidomyiidae (78%) are probably new species, four of which are going to be described in other papers, as well as the previously unknown larvae of *L. spinosa*. *L. spinosa* and *C. vena* associated with *C. floribundus* (Euphorbiaceae) are registered in the São Paulo State for the first time.

Parasitoids were found in 15% of the sampled galls (Table 1) and belong to Hymenptera families Encyrtidae, Eulophidae (Entedoninae, Eulophinae), Eurytomidae (Rileynae), Pteromalidae, Perilampidae, and Torymidae. When compared to other environments as the Cerrado in Minas Gerais State (34%, Maia & Fernandes, 2004), Restinga in São Paulo State (24%, Maia *et al.,* 2008), and especially the Restinga in Rio de Janeiro State (95%, Maia & Azevedo, 2009) such result is relatively low.

Herein, *Bauhinia holophylla* (Bong.) Steud is registered as host plant of Cecidomyiidae for the first time. The results of this work help increase knowledge about the diversity of the host plant and gall-maker associations in the Neotropical region, which, despite researchers' efforts, still presents large information gaps.

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