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ARTICLE

Insect galls of Parque Nacional da Serra dos Órgãos (Rio de Janeiro State, Southeastern Brazil)

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Abstract. The Parque Nacional da Serra dos Órgãos (PARNASO) is an integral protection conservation unit inserted in the domain of the Atlantic forest. This Park was investigated monthly from September to December/2021 and from March to May/2022 for insect galls. Host plants were identified and their exsiccates were deposited in the herbarium (R) of the Museu Nacional. Insects obtained by gall dissection and rearing were deposited in the Entomological Collection of Museu Nacional (MNRJ). The conservational status of the host plants and their origin were verified in the site Flora e Funga do Brasil (2023). New records of host plants in Brazil are presented based on comparison with literature data. PARNASO hosts a great richness of galls (290 gall morphotypes on 43 plant families). Myrtaceae, Melastomataceae, Asteraceae, Fabaceae, and Rubiaceae, *Mikania* Willd. (Asteraceae), *Miconia* Ruiz & Pav. (Melastomataceae), and *Eugenia* L. (Myrtaceae), and *Guapira opposita* (Nyctaginaceae) were the botanical taxa with the highest number of gall morphotypes, all of them were previously indicated as super hosts in inventories in forest formations of the Atlantic forest, except Rubiaceae. PARNASO includes 148 gall-inducing species native to Brazil, being 69 endemic; among the last 23 are exclusive to the Atlantic forest. Eight gall-inducing species are endangered and four are near threathned. Most galls were found on leaves. The most frequent gall characters were: globoid shape, green color, and glabrous surface. Most galls were induced by Cecidomyiidae (Diptera), however galls of Lepidoptera, Coleoptera, Hemiptera, Thysanoptera, and Hymenoptera wera also found. These are the known patterns in Brazil. The secondary fauna was reported in 62 gall morphotypes and included parasitoids (Hymenoptera), successors (Collembola, Hemiptera and Thysanoptera), cecidophagous (Lepidoptera), and predators (spiders). Parasitoids were the most frequent. Seven gall midge species are recorded for the first time in this Park.

Keywords. Atlantic forest; Insect-plant interaction; Endemism; Gall richness; Secondary fauna.

INTRODUCTION

Several inventories of insect galls have been developed in the Brazilian Atlantic forest in the last three decades. The first systematic inventories were carried out in restinga areas of the state of Rio de Janeiro by Monteiro *et al.* (1994), Maia (2001), and Oliveira & Maia (2005). Later, other restingas (Maia *et al.,* 2008; Bregonci *et al.,* 2010; Arriola *et al.,* 2015; and Carvalho-Fernandes *et al.,* 2016, for example) and forest formations (Fernandes *et al.,* 2009; Maia *et al.,* 2014; Santos & Ribeiro, 2015; Maia & Mascarenhas, 2017; and others) were investigated. However, these inventories only cover a small part of the entire Atlantic forest, so that the richness of this phytogeographic domains is still little known.

The Parque Nacional da Serra dos Órgãos (PARNASO) is an integral protection conservation unit inserted in the domain of the Atlantic forest, one of the most critical biomes for the conservation of global biodiversity. This Park was created in 1939 to protect the biodiversity of Serra do Mar in Rio de Janeiro State. With about 20,000 hectares, it covers four municipalities: Teresópolis, Petrópolis, Magé, and Guapimirim (ICMBio, 2023). PARNASO has a rich flora, with more than 2,800 plant species, many exclusive to the Atlantic forest, distributed in four physiognomies, according to altitude: submontane forest (up to 500 m), montane forest (between 500 and 1,500 m), upper montane forest (above 1,500 m) and altitude fields (above 2,000 m). This Park has a large volume of rainfall (3,600 mm per year), one of the determining factors for the richness and perennial exuberance of its vegetation (ICMBio, 2023).

Regarding the fauna, around 750 vertebrate species have been identified in the Park. Nevertheless, data on the entomofau-

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na is still scarce, with only about 120 recorded species of Coleoptera, Diptera, Ephemeroptera, Hemiptera, Hymenoptera, Odonata, and Orthoptera (ICMBio, 2023). Until now, the Park lacks a systematic survey of insect galls.

The main goal of this research is to inventory the insect galls of PARNASO and evaluate their richness, thus contributing to the knowlegde of the richness and distribution of gall-inducing insects and their host plants in the Atlantic forest.

MATERIAL AND METHODS

The PARNASO was investigated monthly by the authors from September to December/2021 (in late winter and spring) and from March to May/2022 (in fall). Each campaign lasted four days, performing 32 hours of field work. All campaigns together totaled 28 days with 224 hours of field work. The number of personnel was standardized for each collection: two researchers, VCM and BM. We surveyed 11 trails in Guapimirim (Figs. 1A-G, 2A-D)

Figure 1. Parque Nacional da Serra dos Órgãos (RJ, Brazil), trails in Guapimirim: (A) Alameda Von Spix, (B) Araçari camping, (C) Caninana Trail, (D) Circular Trail, (E) Mãe d'Água Trail, (F) Museu Von Martius, (G) Poço da Capela.

Figure 2. Parque Nacional da Serra dos Órgãos (RJ, Brazil), trails in Guapimirim: (A) Poço da Preguiça, (B) Poço Verde, (C) Ponte Velha, (D) Recanto das Ruínas.

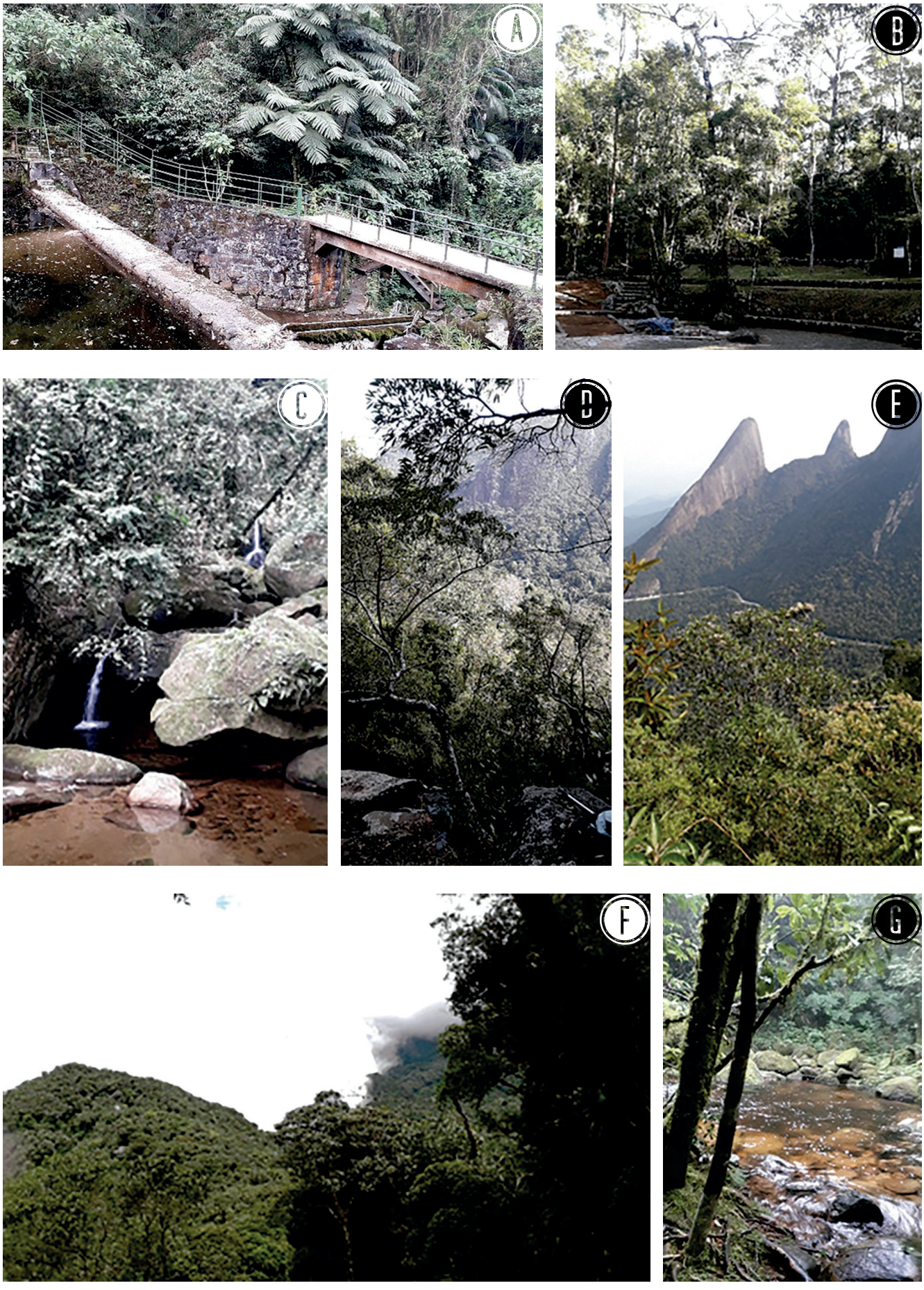

Figure 3. Parque Nacional da Serra dos Órgãos (RJ, Brazil), trails in Teresópolis: (A) Barragem, (B) Bosque Santa Helena, (C) Cachoeira Ceci-Peri, (D) Cachoeira do Papel, (E) Cartão Postal Trail, (F) Casa do Pesquisador, (G) Mozart-Catão Trail.

Figure 4. Parque Nacional da Serra dos Órgãos (RJ, Brazil), trails in Teresópolis: (A) Poço do Beija-Flor, (B) Poço do Castelo, (C) Poço Dois Irmãos, (D) Primavera Trail, (E) Suspensa Trail, (F) 360 Trail.

Table 1. Trails of Parque Nacional da Serra dos Órgãos (Southeastern Brazil), with their respective geographic coordinates and date of investigation.

Municipality	Trail	Geographic coordinates	Data
Guapimirim	Alameda Von Spix	22°07′20.7″-22°29′46.0″S 42°59′52.5″-42°59′47.9″W	April, 2022 May, 2022
Guapimirim	Araçari Camping	22°29′40.7″-22°29′44.2″S 43°00′06.1″-43°00′03.92″W	April, 2022
Guapimirim	Caninana Trail	22°29′41.4″-22°29′41.5″S 42°59′51.1″-42°59′53.8″W	March, 2022 May, 2022
Guapimirim	Circular Trail	22°29′37.3″-22°29′30.5″S 42°59′54.3″-43°00′16.2″W	April, 2022
Guapimirim	Mãe d'Água Trail	22°29′38.1″-22°29′39.4″S 43°00′00.8″-42°59′55.8″W	March, 2022 May, 2022
Guapimirim	Museu Von Martius	22°29′39.86″S-43°00′04.7″W	March, 2022 April, 2022
Guapimirim	Poço da Capela	22°29′41.4″-22°29′42.0″S 42°59′51.1″-42°59′47.1″W	March, 2022 May, 2022
Guapimirim	Poço da Preguiça	22°29′35.0″-22°29′33.8″S 43°00′06.5″-43°00′05.6″W	March, 2022
Guapimirim	Poço Verde	22°29′38.3″-22°29′30.5″S 43°00′56.0″-43°00′16.2″W	March, 2022
Guapimirim	Ponte Velha	22°29′37.3″S-42°59′54.3″W	March, 2022
Guapimirim	Recanto das Ruínas	22°29′44.0″-22°29′42.0″S 42°59′48.8″-42°59′50.7″W	March, 2022
Teresópolis	Barragem Road	22°27′07.7″-22°27′04.6″S 42°59′18.5″-43°00′04.8″W	September, 2021 October, 2021 December, 2021 March, 2022 May, 2022
Teresópolis	Bosque Santa Helena	22°26′53.5″-42°59′09.6″S	November, 2021 December, 2021
Teresópolis	Cachoeira Ceci-Peri	22°27′23.7″-22°27′24.3″S 42°59′52.3″-42°59′53.0″W	September, 2021 May, 2022
Teresópolis	Cachoeira do Papel	22°27′08.8″S-43°00′55.9″W	September, 2021
Teresópolis	Cartão Postal Trail	22°27′20.6″-22°27′42.0″S 42°59′37.3″-42°59′43.0″W	September, 2021 May, 2022
Teresópolis	Casa do Pesquisador	22°27′19.4″S-42°59′51.7″W	September, 2021
Teresópolis	Mozart-Catão Trail	22°27′14.7″-22°27′07.7″S 42°59′32.7″-42°59′13.4″W	October, 2021 May, 2022
Teresópolis	Poço do Beija-Flor	22°27′05.7″-22°27′05.2″S 43°00′03.3″-43°00′01.9″	December, 2021
Teresópolis	Poço do Castelo	22°26′54.8″-22°26′52.92″S 42°59′03.2″-42°59′04.1″W	December, 2021
Teresópolis	Poço Dois Irmãos	22°26′53.5″-22°26′55.00″S 42°59′09.6″-42°59′18.6″W	November, 2021
Teresópolis	Primavera Trail	22°27′07.7″-22°26′58.8″S 42°59′13.4″-42°59′20.8″W	September, 2021
Teresópolis	Suspensa Trail	22°27′06.2″-22°27′24.0″S 43°00′04.4″-42°59′51.4″W	November, 2021 May, 2022
Teresópolis	360 Trail	22°27′29.6″-22°27′06.3″S 42°59′34.2″-42°59′19.8″W	October, 2021

Table 2. Richness of host plant species and insect gall morphotypes by plant family in the Parque Nacional da Serra dos Órgãos (Southeastern Brazil).

Plant family (n = 43)	Nr. host genera (n = 81)	Nr. host species and/or morphospecies	Nr. gall morphotypes (n = 290)	Nr. gall morphotypes/ plant species
Acanthaceae	2	2	3	1.5
Annonaceae	1	2	3	1.5
Apocynaceae	1	1	1	1.0
Araceae	1	3	4	1.3
Araliaceae	1	1	1	1.0
Asteraceae	**5**	**20**	**31**	**1.5**
Bignoniaceae	5	8	9	1.1
Boraginaceae	1	1	1	1.0
Cactaceae	1	1	1	1.0
Celastraceae	1	1	1	1.0
Chrysobalanaceae	1	1	1	1.0
Clusiaceae	2	2	2	1.0
Curcubitaceae	1	2	2	1.0
Dioscoreaceae	1	1	1	1.0
Dryopteridaceae	1	1	1	1.0
Euphorbiaceae	3	3	4	1.3
Fabaceae	**8**	**17**	**28**	**1.6**
Gesneriaceae	1	1	1	1.0
Lauraceae	1	4	5	1.2
Loranthaceae	1	1	1	1.0
Malpighiaceae	3	5	9	1.8
Malvaceae	1	1	1	1.0
Melastomataceae	**5**	**28**	**38**	**1.36**
Meliaceae	2	3	5	1.7
Monimiaceae	1	2	3	1.5
Moraceae	1	1	1	1.0
Myrsinaceae	1	1	1	1.0
Myrtaceae	**6**	**25**	**40**	**1.6**
Nyctaginaceae	1	1	11	11.0
Onagraceae	1	1	1	1.0
Picramniaceae	1	1	1	1.0
Piperaceae	1	7	13	1.8
Polypodiaceae	1	1	1	1.0
Primulaceae	1	1	3	3.0
Rubiaceae	**7**	**16**	**29**	**1.8**
Salicaceae	1	2	3	1.5
Sapindaceae	2	6	15	2.5
Sapotaceae	1	1	3	3.0
Smilacaceae	1	1	2	2.0
Solanaceae	2	2	4	2.0
Verbenaceae	1	2	3	1.5
Violaceae	1	1	1	1.0
Vitaceae	1	1	1	1.0

and 13 trails in Teresópolis (Figs. 3A-G, 4A-F) in different months, and their geographic coordinates were obtained using GPS (Table 1).

We investigated herbs, bushes and trees (up to 2 m heigh) of each trail in a search for galls on leaves, buds, stems, tendrils, aerial roots, flowers, bud flowers, and fruits. We removed, labeled, pressed and dried preferentially fertile branches of each host plant species. Dr. Ricardo Moura identified the host plants species and morphospecies. Their exsiccates were deposited in the herbarium (R) of the Museu Nacional/Universidade Federal do Rio de Janeiro. We collected galled branches, and characterized the galls in different morphotypes according to their shape, color, presence or absence of trichomes, and plant organ of occurrence. Then we packed each morphotype individually and transported them in labelled plastic bags. The labels comprised the following data: trail name, date, number of the galled plant, and gall morphotype. We photographed all host plants and gall morphotypes. In the laboratory, we dissected samples of each morphotype in order to observe the number of internal chambers, the food habit of the dwellers and

Table 3. Host plants and richness of insect galls of the Parque Nacional da Serra dos Órgãos (Southeastern Brazil).

	Host Plant	Nr. gall morphotypes (n=290)
Acanthaceae	*Justicia* sp.	1
	Mendoncia velloziana Mart.	2
Annonaceae	*Guatteria* cf. *australis* A. St.-Hill	2
	Guatteria sp.	1
Apocynaceae	*Forsteronia* sp.	1
Araceae	*Philodendron propinquum* Schott.	1
	Philodendron roseopetiolatum Nadruz & Mayo	1
	Philodendron sp.	2
Araliaceae	*Dendropanax* sp.	1
Asteraceae	*Baccharis* sp.	1
	Dasyphyllum flagellare (Casar.) Cabrera	1
	Dasyphyllum leptacanthum (Gardner) Cabrera	2
	Lepidaploa sp.	1
	Mikania cf. *campanulata* Gardner	2
	Mikania cf. *confertissima* Sch. Bip.	4
	Mikania hirsutissima DC.	3
	Mikania cf. *paniculata* DC.	4
	Mikania cf. *ternata* (Vell.) B.L. Rob.	1
	Mikania sp. 1	1
	Mikania sp. 2	1
	Mikania sp. 3	3
	Piptocarpha quadrangularis (Vell.) Baker	1
	Piptocarpha sp.	2
	Asteraceae sp. 1	1
	Asteraceae sp. 2	1
	Asteraceae sp. 3	1
	Asteraceae sp. 4	1
	Asteraceae sp. 5	1
	Asteraceae sp. 6	1
Bignoniaceae	*Adenocalymma* sp.	1
	Handroanthus serratifolius (Vahl.) S. Grose	1
	Handroanthus sp.	1
	Lundia damaziel C. DC.	1
	Stizophyllum perforatum (Cham.) Miers	2
	Tanaecium pyramidatum (Rich.) L.G. Lohmann	1
	Bignoniaceae sp. 1	1
	Bignoniaceae sp. 2	1
Boraginaceae	*Varronia* sp.	1
Cactaceae	*Rhipsalis olivifera* N.P. Taylor & Zappi	1
Celastraceae	Celastraceae sp.	1
Chrysobalanaceae	*Licania spicata* Hook. f.	1
Clusiaceae	*Clusia lanceolata* Camb.	1
	Tovomitopsis paniculata (Spreng.) Planch & Triana	1
Curcubitaceae	*Cayaponia* sp. 1	1
	Cayaponia sp. 2	1
Dioscoreaceae	*Dioscorea laxiflora* Mart. ex Griseb	1
Dryopteridaceae	*Polybotrya* sp.	1
Euphorbiaceae	*Croton echinocarpus* Müll. Arg.	1
	Croton floribundus Spreng.	1
	Plukenetia serrata (Vell.) L.J. Gillespie	1
	Sapium glandulosum (L.) Morong	1
Fabaceae	*Copaifera trapezifolia* Hayne	2
	Copaifera sp.	1
	Dahlstedtia pinnata	1
	Dalbergia foliolosa Benth.	3
	Dalbergia sp. 1	2
	Dalbergia sp. 2	2
	Inga barbata Benth.	2
	Inga lanceifolia Benth.	2
	Inga marginata Willd.	2
	Inga sessilis (Vell.) Mart.	1
	Inga sp.	1
	Machaerium nyctitans (Vell.) Benth.	3
	Machaerium oblongifolium Vogel	1
	Myrocarpus frondosus Alemão	1
	Pseudopiptadenia inaequalis (Benth.) Rauschert	2
	Senegalia sp. 1	1
	Senegalia sp. 2	1
Gesneriaceae	*Nematanthus crassifolius* (Schott.) Wiehler	1
Lauraceae	*Ocotea* cf. *elegans* Mez	2
	Ocotea sp. 1	1
	Ocotea sp. 2	1
	Lauraceae sp.	1
Loranthaceae	*Struthanthus* sp.	1
Malpighiaceae	*Bunchosia* cf. *maritima* (Vell.) J.F. Macbr	1
	Bunchosia sp.	3
	Heteropterys sp. 1	1
	Heteropterys sp. 2	1
	Niedenzuella poeppigiana (A. Juss.) W.R. Anderson	3
Malvaceae	*Eriotheca* sp.	1
Melastomataceae	*Bertolonia acuminata* Gardner	1
	Leandra acutiflora (Naudin) Cogn.	1
	Meriania paniculata (DC.) Triana	1
	Meriania sp.	1
	Miconia buddlejoides Triana	4
	Miconia fasciculata Gardner	3
	Miconia paniculata (DC.) Naudin	1
	Miconia sp. 1	1
	Miconia sp. 2	1
	Miconia sp. 3	1
	Miconia sp. 4	2
	Miconia sp. 5	1
	Miconia sp. 6	1
	Miconia sp. 7	1
	Miconia sp. 8	2
	Pleroma sp. 1	1
	Pleroma sp. 2	1
	Pleroma sp. 3	1
	Pleroma sp. 4	1
	Pleroma sp. 5	1
	Melastomataceae sp. 1	2
	Melastomataceae sp. 2	2
	Melastomataceae sp. 3	1
	Melastomataceae sp. 4	2
	Melastomataceae sp. 5	1
	Melastomataceae sp. 6	1
	Melastomataceae sp. 7	1
	Melastomataceae sp. 8	1
Meliaceae	*Guarea guidonia* (L.) Sleumer	1
	Guarea macrophylla subsp. *tuberculata* (Vell.) T.D. Penn	2
	Trichilia silvatica C. DC.	2
Monimiaceae	*Mollinedia glabra* (Spreng.) Perkins	2
	Mollinedia schottiana (Spreng.) Perkins	1
Moraceae	*Sorocea guilleminiana* Gaudich.	1
Myrsinaceae	*Myrsine* sp.	1
Myrtaceae	*Campomanesia guaviroba* (DC.) Kiaersk.	2

	Host Plant	Nr. gall morphotypes (n=290)
	Eugenia laruotteana Cambess.	2
	Eugenia prasina O. Berg.	2
	Eugenia uniflora L.	1
	Eugenia sp. 1	1
	Eugenia sp. 2	4
	Eugenia sp. 3	3
	Eugenia sp. 4	2
	Myrcia sp. 1	2
	Myrcia sp. 2	1
	Myrcia sp. 3	1
	Myrcia sp. 4	1
	Myrciaria disticha O. Berg.	2
	Plinia martinelli G.M. Barroso & M.V. Peron	1
	Siphoneugena sp. 1	3
	Siphoneugena sp. 2	1
	Myrtaceae sp. 1	2
	Myrtaceae sp. 2	1
	Myrtaceae sp. 3	1
	Myrtaceae sp. 4	1
	Myrtaceae sp. 5	2
	Myrtaceae sp. 6	1
	Myrtaceae sp. 7	1
	Myrtaceae sp. 8	1
	Myrtaceae sp. 9	1
Nyctaginaceae	*Guapira opposita* (Vell.) Reitz.	11
Onagraceae	*Fuchsia regia* (Vell.) Munz.	1
Picramniaceae	*Picramnia glazioviana* Engl.	1
Piperaceae	*Piper anisum* (Spreng.) Angely	3
	Piper arboreum Aubl	1
	Piper cernuum Vell.	1
	Piper pseudopothifolium C. DC.	1
	Piper rioense Yunck.	5
	Piper sprengelianum C. DC.	1
	Piper sp.	1
Polypodiaceae	*Niphidium crassifolium* (L). Lellinger	1
Primulaceae	*Cybianthus* sp.	3
Rubiaceae	*Bathysa mendoncaei* K. Schum.	1
	Emmeorhiza umbellata (Spreng.) K. Schum.	1
	Faramea cf. *truncata* (Vell.) Müll. Arg.	2
	Palicourea sessilis (Vell.) C.M. Taylor	4
	Psychotria appendiculata Müll. Arg.	1
	Psychotria leiocarpa Cham. & Schltdl.	2
	Psychotria nuda (Cham. & Schltdl.) Waw	2
	Psychotria pallens Gardner	2
	Psychotria suterella Müll. Arg.	3
	Psychotria sp. 1	1
	Psychotria sp. 2	1
	Randia armata (Sw.) DC.	1
	Rudgea jasminoides (Cham.) Müll. Arg.	4
	Rudgea sp. 1	2
	Rudgea sp. 2	1
	Rudgea sp. 3	1
Salicaceae	*Casearia obliqua* Spreng.	1
	Casearia pauciflora Cambess.	2
Sapindaceae	*Paullinia carpopoda* Cambess.	2
	Paullinia sp.	2
	Serjania caracasana (Jacq.) Willd.	4
	Serjania corrugata Radt.	2
	Serjania sp.	3
	Sapindaceae sp.	2
Sapotaceae	*Chrysophyllum flexuosum* Mart.	3
Smilacaceae	*Smilax fluminensis* Steud.	2
Solanaceae	*Athenaea fasciculata* (Vell.) I.M.C. Rodrigues	1
	Solanum piluliferum Dunal	1
	Solanum swartzianum Roem. & Schult.	2
Verbenaceae	*Lantana camara* L.	2
	Lantana robusta Schauer	1
Violaceae	*Anchietea pyrifolia* (Mart.) G. Don.	1
Vitaceae	*Clematicissus striata* (Ruiz. & Pav.) Lombardi	1

to obtain the immature insects. We conditioned other samples individually in labelled plastic pots to obtain the adults. Each pot was lined with a layer of toilet paper. We checked all pots daily. The galls were kept in the pots until the emergence of adult insects or until gall putrefaction. All insects were preserved in 70% alcohol. Later, we mounted the Cecidomyiidae specimens on microscope slides, following the methodology outlined in Gagné (1994), and identified genera based on the keys of Gagné (op. cit.). The insects were deposited in the Entomological Collection of Museu Nacional (MNRJ). The conservational status of the host plants (EN = endangered, NE = not evaluated, NT = near threatened, LC = less concerning, VU = vulnerable) and their origin (native, endemic, exotic and naturalized) were verified in the site Flora e Funga do Brasil (2023). New records of host plants in Brazil are presented based on comparison with literature data.

RESULTS

We found 290 gall morphotypes on 43 plant families, 81 genera, 93 nominated species and 91 morphospecies (63 identified to in genus and 28 to in family) (Table 2). The lack of fertile material explains this large number of plant morphospecies.

Myrtaceae, Melastomataceae, Asteraceae, Fabaceae, and Rubiaceae were the five plant families with the greatest richness of insect galls (Table 2). Regarding botanical genera, *Mikania* Willd. (Asteraceae), *Miconia* Ruiz & Pav. (Melastomataceae), and *Eugenia* L. (Myrtaceae) stood out as super hosts (Table 3). *Guapira opposita* (Nyctaginaceae) was the plant species with the highest number of gall morphotypes (Table 3).

All plant species are native to Brazil, except *Lantana camara* L. (Verbenaceae), which is naturalized. Among the native plants, 46 are endemic to Brazil, 30 of them are known only from the Atlantic forest. Native plant species shelter 148 gall morphotypes, endemic species 69, and the only naturalized species shelter two morphotypes. Endemic plant species with exclusive occurrence in the Atlantic forest shelter 23 gall morphotypes (Table 4).

Concerning plant conservation status, three species are endangered, *Dasyphyllum leptacanthum* (Gardner) Cabrera (Asteraceae), *Piper rioense* Yunkc. (Piperaceae), and *Plinia martinelli* G.M. Barroso & M.V. Peron Cabrera

Table 4. Plant species origin, conservation status, phytogeographic domain of occurrence, and number of gall morphotypes. EN = endangered, NE = not evaluated, NT = near threatened, and LC = less concerning.

Host Plant		Nr. gall morphotypes
Species	Origin/Phytogeographic domain/Conservation status	
Mendoncia velloziana Mart.	Native/Atlantic Forest/NE	2
Philodendron propinquum Schott.	Endemic/Atlantic Forest/NE	1
Philodendron roseopetiolatum Nadruz & Mayo	Endemic/Atlantic Forest/NE	1
Dasyphyllum flagellare (Casar.) Cabrera	Endemic/Atlantic Forest and Cerrado/NE	1
Dasyphyllum leptacanthum (Gardner) Cabrera	Endemic/Atlantic Forest/EN	2
Mikania hirsutissima DC.	Native/Atlantic Forest, Caatinga, and Cerrado/NE	3
Piptocarpha quadrangularis (Vell.) Baker	Endemic/Atlantic Forest/NE	1
Handroanthus serratifolius (Vahl.) S. Grose	Native/Amazon, Atlantic Forest, Caatinga, Cerrado, and Pantanal/NT	1
Lundia damazioi C. DC.	Endemic/Atlantic Forest and Cerrado/NE	1
Stizophyllum perforatum (Cham.) Miers	Native/Atlantic Forest and Cerrado/NE	2
Tanaecium pyramidatum (Rich.) L.G. Lohmann	Native/Amazon, Atlantic Forest, Caatinga, Cerrado, Pampa, and Pantanal/NE	1
Rhipsalis olivifera N.P. Taylor & Zappi	Endemic/Atlantic Forest/NE	1
Licania spicata Hook. f.	Endemic/Atlantic Forest/LC	1
Clusia lanceolata Camb.	Endemic/Atlantic Forest/NE	1
Tovomitopsis paniculata (Spreng.) Planch & Triana	Endemic/Atlantic Forest/NE	1
Dioscorea laxiflora Mart. ex Griseb	Native/Amazon, Atlantic Forest, Caatinga, and Cerrado/NE	1
Croton echinocarpus Müll. Arg.	Endemic/Atlantic Forest/LC	1
Croton floribundus Spreng.	Native/Atlantic Forest/NE	1
Plukenetia serrata (Vell.) L.J. Gillespie	Endemic/Atlantic Forest/NE	1
Sapium glandulosum (L.) Morong	Native/Amazon, Atlantic Forest, Caatinga, and Cerrado/NE	1
Copaifera trapezifolia Hayne	Native/Atlantic Forest/NE	2
Dahlstedtia pinnata (Benth.) Malme	Endemic/Atlantic Forest/LC	1
Dalbergia foliolosa Benth.	Native/Atlantic Forest and Cerrado/NE	3
Inga barbata Benth.	Native/Atlantic Forest and Cerrado/NE	2
Inga lanceifolia Benth.	Endemic/Atlantic Forest/LC	2
Inga marginata Willd.	Native/Amazon, Atlantic Forest, Cerrado and Pampa/NE	2
Inga sessilis (Vell.) Mart.	Endemic/Amazon, Atlantic Forest and Cerrado/LC	1
Machaerium nyctitans (Vell.) Benth.	Native/Atlantic Forest and Cerrado/LC	3
Machaerium oblongifolium Vogel	Endemic/Atlantic Forest, Caatinga and Cerrado/NE	1
Myrocarpus frondosus Alemão	Native/Atlantic Forest/LC	1
Pseudopiptadenia inaequalis (Benth.) Rauschert	Endemic/Atlantic Forest/NT	2
Nematanthus crassifolius (Schott.) Wiehler	Endemic/Atlantic Forest/LC	1
Niedenzuella poeppigiana (A. Juss.) W.R. Anderson	Native/Amazon and Atlantic Forest/LC	3
Bertolonia acuminata Gardner	Native/Atlantic Forest/NE	1
Leandra acutiflora (Naudin) Cogn.	Endemic/Atlantic Forest and Cerrado/NE	1
Meriania paniculata (DC.) Triana	Endemic/Atlantic Forest/NE	1
Miconia buddlejoides Triana	Native/Atlantic Forest/NE	4
Miconia fasciculata Gardner	Endemic/Atlantic Forest/LC	3
Miconia paniculata (DC.) Naudin	Endemic/Atlantic Forest and Cerrado/NE	1
Guarea guidonia (L.) Sleumer	Native/Amazon, Atlantic Forest, Caatinga, and Cerrado/NE	1
Guarea macrophylla subsp. *tuberculata* (Vell.) T.D. Penn	Native/Amazon, Cerrado, and Pampa/NE	2
Trichilia silvatica C. DC.	Endemic/Atlantic Forest and Cerrado/LC	2
Mollinedia glabra (Spreng.) Perkins	Endemic/Atlantic Forest/LC	2
Mollinedia schottiana (Spreng.) Perkins	Endemic/Atlantic Forest/NE	1
Sorocea guilleminiana Gaudich.	Endemic/Atlantic Forest and Cerrado/LC	1
Campomanesia guaviroba (DC.) Kiaersk.	Native/Atlantic Forest and Cerrado/NE	2
Eugenia laruotteana Cambess.	Endemic/Atlantic Forest and Cerrado/LC	2
Eugenia prasina O. Berg.	Endemic/Atlantic Forest and Cerrado/LC	2
Eugenia uniflora L.	Native/Atlantic Forest, Caatinga, Cerrado and Pampa/NE	1
Myrciaria disticha O. Berg.	Endemic/Atlantic Forest/LC	2
Plinia martinelli G.M. Barroso & M.V. Peron	Endemic/Atlantic Forest/EN	1
Guapira opposita (Vell.) Reitz.	Native/Amazon, Atlantic Forest, Caatinga and Cerrado/NE	11
Fuchsia regia (Vell.) Munz.	Native/Atlantic Forest, Cerrado and Pampa/LC	1
Picramnia glazioviana Engl.	Endemic/Atlantic Forest and Cerrado/NE	1
Piper anisum (Spreng.) Angely	Endemic/Atlantic Forest and Cerrado/NE	3
Piper arboreum Aubl	Native/Amazon, Atlantic Forest, Caatinga, and Cerrado/NE	1
Piper cernuum Vell.	Native/Amazon, Atlantic Forest, Caatinga, and Pampa/NE	1
Piper pseudopothifolium C. DC.	Endemic/Atlantic Forest/NE	1

Host Plant		Nr. gall morphotypes
Species	Origin/Phytogeographic domain/Conservation status	
Piper rioense Yunck.	Endemic/Atlantic Forest/EN	5
Piper sprengelianum C. DC.	Endemic/Atlantic Forest and Cerrado/NT	1
Niphidium crassifolium (L.) Lellinger	Native/Amazon, Atlantic Forest, Caatinga, Cerrado, Pampa, and Pantanal/NE	1
Bathysa mendoncaei K. Schum.	Endemic/Atlantic Forest/LC	1
Emmeorhiza umbellata (Spreng.) K. Schum.	Native/Amazon, Atlantic Forest, Caatinga, Cerrado, Pampa, and Pantanal/NE	1
Palicourea sessilis (Vell.) C.M. Taylor	Native/Atlantic Forest/NE	4
Psychotria appendiculata Müll. Arg.	Endemic/Amazon and Atlantic Forest/NE	1
Psychotria leiocarpa Cham. & Schltdl.	Native/Atlantic Forest, Cerrado, and Pantanal/NE	2
Psychotria nuda (Cham. & Schltdl.) Waw	Endemic/Atlantic Forest/NE	2
Psychotria pallens Gardner	Endemic/Atlantic Forest/NE	2
Psychotria suterella Müll. Arg.	Native/Atlantic Forest/NE	3
Randia armata (Sw.) DC.	Native/Amazon, Atlantic Forest, Caatinga, and Cerrado/NE	1
Rudgea jasminoides (Cham.) Müll. Arg.	Native/Atlantic Forest and Cerrado/NE	4
Casearia obliqua Spreng.	Endemic/Amazon, Atlantic Forest, Cerrado, and Pampa/LC	1
Casearia pauciflora Cambess.	Endemic/Atlantic Forest/LC	2
Paullinia carpopoda Cambess.	Endemic/Atlantic Forest and Cerrado/—	2
Serjania caracasana (Jacq.) Willd.	Native/Amazon, Atlantic Forest, Caatinga, Cerrado, and Pantanal/NE	4
Serjania corrugata Radt.	Endemic/Atlantic Forest/NE	2
Chrysophyllum flexuosum Mart.	Endemic/Atlantic Forest/LC	3
Smilax fluminensis Steud.	Native/Amazon, Atlantic Forest, Cerrado, and Pantanal/NE	2
Athenaea fasciculata (Vell.) I.M.C. Rodrigues	Native/Atlantic Forest/NE	1
Solanum piluliferum Dunal	EndemicAtlantic Forest/NE	1
Solanum swartzianum Roem. & Schult.	Native/Atlantic Forest and Cerrado/NE	2
Lantana camara L.	Naturalized/Amazon, Atlantic Forest, Caatinga, Cerrado, Pampa, and Pantanal/NE	2
Lantana robusta Schauer	Endemic/Atlantic Forest/NE	1
Anchietea pyrifolia (Mart.) G. Don.	Native/Atlantic Forest, Caatinga, Cerrado, Pampa, and Pantanal/NE	1
Clematicissus striata (Ruiz. & Pav.) Lombardi	Native/Atlantic Forest, Cerrado, and Pampa/NE	1

Table 5. Number of gall morphotypes by host plant organ in the Parque Nacional da Serra dos Órgãos, RJ, Brazil. The total is higher than 100% because some gall morphotypes occurred in two or more plant organs.

Galled plant organs	Number of gall morphotypes
Leaf	181 (62.4%)
Stem	69 (23.8%)
Bud	45 (15.5%)
Flower	0 (0.0%)
Fruit	1 (0.3%)
Aerial root	1 (0.3%)

Table 6. Number of gall morphotypes by shape in the Parque Nacional da Serra dos Órgãos, RJ, Brazil. The total is higher than 100% because some gall morphotypes varied in shape.

Gall shapes	Number of gall morphotypes
Globoid	126 (43.4%)
Fusiform	103 (35.5%)
Conical	23 (7.9%)
Lenticular	16 (5.5%)
Cylindrical	10 (3.4%)
Marginal roll	6 (2.1%)
Rosette	4 (1.4%)
Ovoid	3 (1.1%)
Fold	2 (0.7%)
Discoid	2 (0.7%)

Table 7. Number of gall morphotypes by color in the Parque Nacional da Serra dos Órgãos, RJ, Brazil. The total is higher than 100% because some gall morphotypes varied in color.

Gall color	Number of gall morphotypes
Green	164 (56.5%)
Brown	106 (36.5%)
Yellow	34 (11.7%)
Red	33 (11.4%)
Black	1 (0.3%)

Table 8. Number of gall morphotypes by gall-inducing insects in the Parque Nacional da Serra dos Órgãos, RJ, Brazil. The total is lower than 100% because some gall-inducers were not determined.

Gall-inducing insects	Number of gall morphotypes
Diptera (Cecidomyiidae)	140 (48.3%)
Coleoptera	8 (2.7%)
Lepidoptera	5 (1.7%)
Hemiptera	2 (0.7%)
Hymenoptera	2 (0.7%)
Thysanoptera	1 (0.3%)

Table 9. Number of gall morphotypes with secondary fauna in the Parque Nacional da Serra dos Órgãos, RJ, Brazil.

Secondary fauna	Number of gall morphotypes
Parasitoids	58 (20.0%)
Successors	4 (1.4%)
Cecidophagous	2 (0.7%)
Predators	1 (0.3%)

(Myrtaceae); three are near threathned, *Handroanthus serratifolius* (Vahl.) S. Grose (Bignoniaceae), *Piper sprengelianum* C. DC. (Piperaceae), and *Pseudopiptadenia inaequalis* (Benth.) Rauschert (Fabaceae); 21 are less concerning; and 56 were not evaluated (Table 4). The first two categories shelter 8 and 4 gall-inducing species re-

spectively, none of them identified in to species. So, PARNASO shelters at least 12 unknown gall-inducing species with some degree of threat.

Most galls were found on leaves (62.4%). Other galled organs were stems, buds, aerial roots, and fruits, with low percentages. Galls on flowers were not found (Table 5).

The most frequent gall shape was globoid (43.4%), followed by fusiform (36.5%) (Table 6). Globoid galls occurred mainly on leaves and fusiform galls on stems and veins. Ten gall morphotypes varied in shape. Most galls were green (56.5%) and 40.8% brown. Yellow, red and black colors were also reported (Table 7). Green galls occurred mainly on leaves while brown galls mainly on stems. Some galls (8.8%) varied in color. Most galls (83.8%) were glabrous, while only 16.2% presented trichomes.

Galls were induced by Diptera (Cecidomyiidae), Lepidoptera, Coleoptera, Hemiptera, Thysanoptera, and Hymenoptera, being Cecidomyiidae the most frequent gall-inducing insects, being responsible for 48.3% of gall morphotypes (Table 8). Inducers of 131 morphotypes (45.2%) were not determined, as only parasitoids were obtained or because the galls were collected after adults' emergence.

The secondary fauna was reported in 62 gall morphotypes (21.4% of the total). It included parasitoids, successors, cecidophagous, and predators. Among them, parasitoids were the most frequent, being reported in 20.0% of the gall morphotypes (Table 9). Successors were represented by Collembola, Hemiptera and Thysanoptera, cecidophagous only by Lepidoptera, and predators only by spiders.

Among gall-inducing insects, we identified seven gall midge species: *Bruggmannia acaudata* Maia, 2004, *B. elongata* Maia & Couri, 1993, *B. robusta* Maia & Couri, 1993, *Clusiamyia nitida* Maia, 1997, *Neolasioptera eugeniae* Maia, 1992, *Proasphondylia guapirae* Maia, 1993, *Sphaeromyia flava* Maia, 2007 and three morphospecies of three genera: *Clinodiplosis* sp. (n = 1), *Dasineura* sp. (n = 1), and *Neolasioptera* sp. (n = 1).

Data on host plants (in alphabetical order of families), gall morphological characterization, gall-inducer, secondary fauna, trails, date of collecting, and previous gall records on each host plant are presented below. The number of gall morphotypes in each botanical family, species, and morphospecies is shown in parentheses after the taxon name.

Acanthaceae (n = 3)

Justicia sp. (n = 1)

Gall: on leaf and bud, fusiform, with an apical cylindrical projection, green, glabrous, one or two-chambered (Fig. 5A). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021), 360 (26.X.2021), Mozart-Catão (27.X.2021).

Maia & Mascarenhas (2017) and Goetz *et al.* (2018) reported galls on *Justicia* spp. in the Parque Nacional do Itatiaia (Southeastern Brazil) and RS.

Mendoncia velloziana Mart. (n = 2)

Gall: on leaf, globoid, intralaminar, green, glabrous, one-chambered. **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* Casa do Pesquisador (14.IX.2021), 360 (26.X.2021), Suspensa (25.XI.2021).
Gall: on stem, fusiform, brown, glabrous, multichambered. **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Casa do Pesquisador (14.IX.2021), Suspensa (25.XI.2021).

First record of gall on this host plant.

Galls on congeneric species are known from Parque Nacional do Itatiaia (Maia & Mascarenhas, 2017) and RS (Mendonça-Jr. *et al.,* 2014).

Annonaceae (n = 3)

Guatteria cf. *australis* A. St.-Hill. (n = 2)

Gall: on leaf, globoid, intralaminar, green, glabrous (Fig. 5B). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* 360 (26.X.2021), Mozart-Catão (27.X.2021, 25.V.2022); *Guapimirim:* Poço Verde (31.III.2022), Mãe d'Água (24.V.2022), Alameda Von Spix (25.V. 2022).
Gall: on stem, fusiform, brown, glabrous, multichambered (Fig. 5C). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Suspensa (26.XI.2021), Mozart-Catão (27.X.2021); *Guapimirim:* Poço Verde (31.III.2022).

Melo-Júnior *et al.* (2018) recorded these galls in Babitonga (SC).

Guatteria sp. (n = 1)

Gall: on leaf, fold, green, glabrous, one-chambered. **Gall-inducer:** not determined. **Trail:** *Teresópolis:* 360 (26.X.2021).

Other galls are known on congeneric species and morphospecies in AM (Almada & Fernandes, 2011), MS (Julião *et al.,* 2014), MG (Fernandes *et al.,* 2001), RJ (Maia & Mascarenhas, 2017), SP (Maia *et al.,* 2008), and SC (Arriola & Melo-Júnior, 2016; Melo-Júnior *et al.,* 2018).

Apocynaceae (n = 1)

Forsteronia sp. (n = 1)

Gall: on stem, fusiform, woody, brown, glabrous (Fig. 5D). **Gall-inducer:** not determined. **Trails:** *Guapimirim:* Poço da Capela (28.III.2022), Ponte Velha (29.III.2022).

Maia *et al.* (2008) recorded galls on this plant genus in Bertioga, SP and Urso-Guimarães *et al.* (2017) in MS.

Araceae (n = 4)

Philodendron propinquum Schott. (n = 1)

Gall: on leaf, marginal roll, yellow, glabrous, one-chambered (Fig. 5E). **Gall-inducer:** Cecidomyiidae. **Trails:**

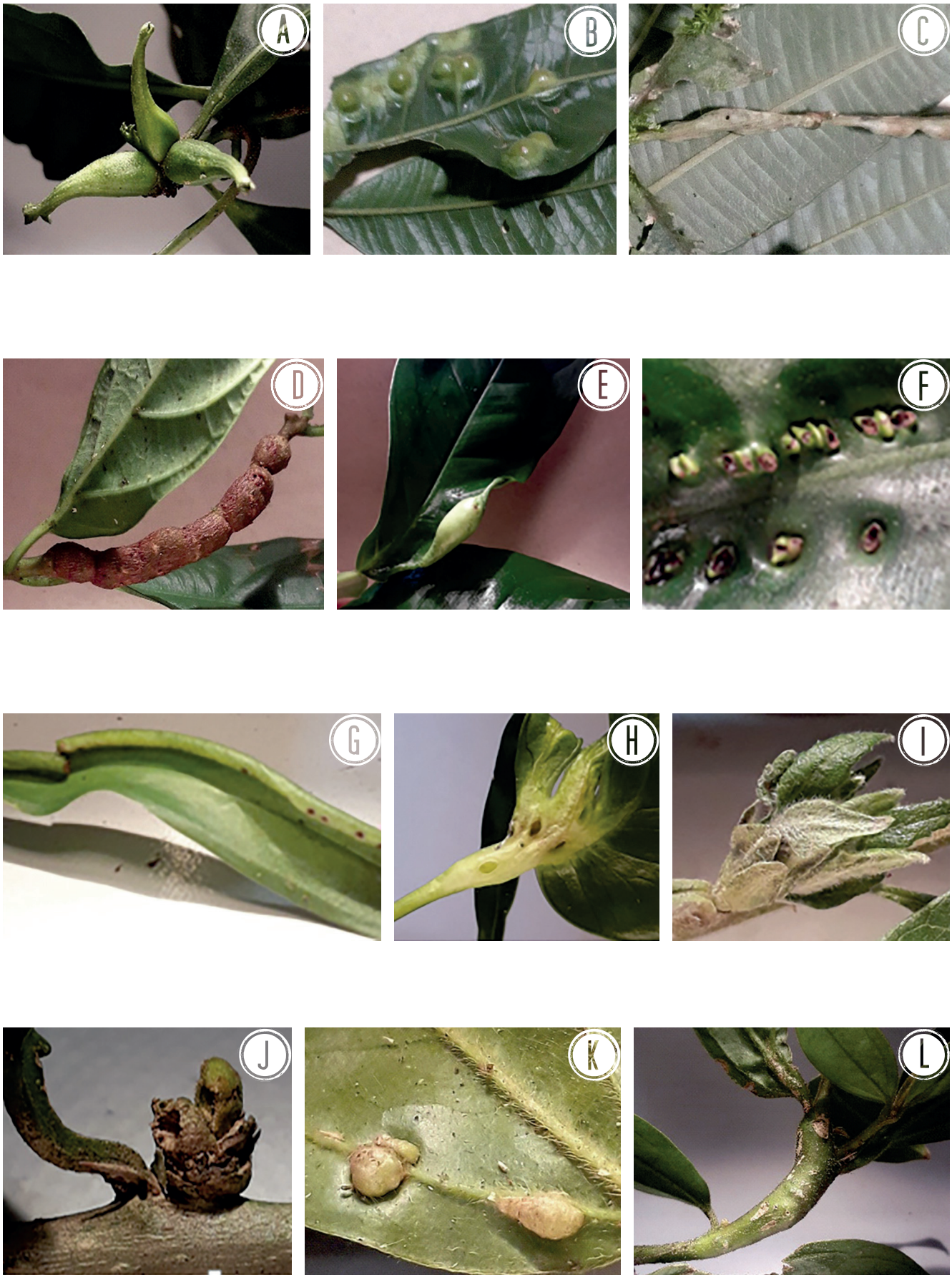

Figure 5. Insect galls of Parque Nacional da Serra dos Órgãos (RJ, Brazil): (A) On *Justicia* sp. (Acanthaceae), bud gall, (B-C) On *Guatterria* cf. *australis* A. St.-Hill. (Annonaceae): (B) leaf gall, (C) stem gall, (D) On *Forsteronia* sp. (Apocynaceae), stem gall, (E-G) On Araceae: (E) On *Philodendron propinquum* Schott., leaf gall, (F) On *Philodendron roseopetiolatum* Nadruz & Mayo, leaf gall, (G) On *Philodendron* sp., leaf gall, (H) On *Dendropanax* sp. (Araliaceae), leaf gall, (I-L) On Asteraceae: (I) On *Baccharis* sp., bud gall, (J) On *Dasyphyllum flagellare* (Casar.) Cabrera, (K-L) On *Dasyphyllum leptacanthum* (Gardner) Cabrera: (K) Leaf gall, (L) Stem gall.

Guapimirim: Poço da Capela (28.III.2022), Poço Verde (31.III.2022), Araçari Camping (25.IV.2022), Circular (26.IV.2022), Mãe d'Água (24.V.2022).

First record of gall on this host plant.

***Philodendron roseopetiolatum* Nadruz & Mayo (n = 1)**

Gall: on leaf, fusiform, green, glabrous, one-chambered (Fig. 5F). **Gall-inducer:** Hymenoptera. **Trails:** *Teresópolis:* 360 (26.X.2021), Mozart-Catão (27.X.2021), Suspensa (25.XI.2021).

First record of gall on this host plant.

***Philodendron* sp. (n = 2)**

Gall: on leaf, marginal roll, green, glabrous (Fig. 5G). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Mozart-Catão to Primavera (25.X.2021), Mozart-Catão (27.X.2021); *Guapimirim:* Mãe d'Água (29.III.2022).
Gall: on leaf, lenticular, yellow, glabrous, one-chambered. **Gall-inducer:** Hymenoptera. **Trail:** *Guapimirim:* Poço Verde (31.III.2022).

Galls on congeneric species and morphospecies are known from PE (Santos *et al.,* 2012), ES (Maia *et al.,* 2014), RJ (Maia & Mascarenhas, 2017), SP (Maia *et al.,* 2008), and SC (Arriola & Melo-Júnior, 2016; Melo-Júnior *et al.,* 2018).

Araliaceae (n = 1)

***Dendropanax* sp. (n = 1)**

Gall: on leaf vein, fusiform, green, glabrous (Fig. 5H). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021).

First record of gall on this plant genus.

Asteraceae (n = 33)

***Baccharis* sp. (n = 1)**

Gall: on bud, rosette, green, glabrous (Fig. 5I). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021).

Several galls on congeneric species and morphospecies are known from MG (Fernandes *et al.,* 1997; Maia & Fernandes, 2004; Carneiro *et al.,* 2009; Coelho *et al.,* 2009; Malves & Frieiro-Costa, 2012), Parque Nacional do Itatiaia (MG and RJ) (Maia & Mascarenhas, 2017) and RS (Mendonça-Jr. *et al.,* 2014).

***Dasyphyllum flagellare* (Casar.) Cabrera (n = 1)**

Gall: on bud, conical, brown, with short trichomes (Fig. 5J). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Cartão Postal (15.IX.2021).

First record of gall on this host plant.

***Dasyphyllum leptacanthum* (Gardner) Cabrera (n = 2)**

Gall: on leaf vein, fusiform, brown, glabrous (Fig. 5K). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021), Mozart-Catão to Primavera (25.X.2021), Mozart-Catão (27.X.2021).
Gall: on stem, fusiform, green, glabrous, multichambered (Fig. 5L). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021), Mozart-Catão to Primavera (25.X.2021), Mozart-Catão (27.X.2021), Suspensa (25.XI.2021).

First record of gall on this plant.

Galls on other species and morphospecies of *Dasyphyllum* Kunth. are known from BA (Silva *et al.,* 2018), MG (Carneiro *et al.,* 2009), RJ (Maia & Souza, 2013), and RS (Mendonça-Jr. *et al.,* 2014).

***Lepidaploa* sp. (n = 1)**

Gall: on stem, fusiform, green, with brown trichomes (Fig. 6A). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Mozart-Catão to Primavera (25.X.2021), 360 (26.X.2021), Mozart-Catão (27.X.2021), Suspensa (25.XI.2021), Centro de Operações to Camping (28.III.2022), Barragem road (from Casa do Pesquisador to Alojamento (30.III.2022).

Carneiro *et al.* (2009) reported galls on several congeneric species in MG. Maia (2001) and Rodrigues *et al.* (2014) recorded galls on *Lepidaploa rufogrisea* (A. St.-Hill.) H. Rob. in RJ (as *Vernonia rufo-grisea* A. St.-Hill.).

***Mikania* cf. *campanulata* Gardner (n = 2)**

Gall: on leaf, cylindrical, green, glabrous, one-chambered (Fig. 6B). **Gall-inducer:** Cecidomyiidae. **Trail:** *Guapimirim:* Museu Von Martius (27.IV.2022).
Gall: on stem, fusiform, brown, glabrous, glabrous, one-chambered (Fig. 6C). **Gall-inducer:** Cecidomyiidae. **Trail:** *Petrópolis:* 360 (26.X.2021).

Toma & Mendonça-Jr. (2013) and Mendonça-Jr. *et al.* (2014) recorded different galls on this host plant in RS.

***Mikania* cf. *confertissima* Sch. Bip. (n = 4)**

Gall: on leaf petiole, fusiform, brown, glabrous (Fig. 6D). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Cartão Postal (15.IX.2021).
Gall: on leaf vein, fusiform, green, glabrous (Fig. 6E). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Cartão Postal (15.IX.2021).
Gall: on stem, fusiform, brown, glabrous. **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Cartão Postal (15.IX.2021).
Gall: on leaf, cylindrical to conical, green, glabrous, one-chambered. **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Cartão Postal (15.IX.2021).

First gall records on this host plant.

***Mikania hirsutissima* DC. (n = 3)**

Gall: on stem and leaf midvein, fusiform to globoid, green or brown, with brown trichomes, one-chambered

Figure 6. Insect galls of Parque Nacional da Serra dos Órgãos (RJ, Brazil): (A-T) On Asteraceae: (A) On *Lepidaploa* sp., stem gall, (B-C) On *Mikania* cf. *campanulata* Gardner: (B) leaf gall, (C) stem gall, (D-E) On *Mikania* cf. *confertissima* Sch. Bip.: (D) leaf vein, (E) leaf petiole, (F-H) On *Mikania hirsutissima* DC.: (F) leaf midvein gall, (G) bud gall, (H) leaf gall, (I-K) On *Mikania* cf. *paniculata* DC.: (I) leaf gall, (J) bud gall, (K) leaf gall, (L) On *Mikania* cf. *ternata* (Vell.) B.L. Rob., leaf gall, (M) On *Mikania* sp. 1, leaf gall, (N) On *Mikania* sp. 2, leaf gall, (O-Q) On *Mikania* sp. 3: (O) leaf gall, (P) bud gall, (Q) stem gall, (R) On *Piptocarpha quadrangularis* (Vell.) Baker, leaf gall, (S-T) On *Piptocarpha* sp.: (S) bud gall, (T) stem gall.

(Fig. 6F). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Successors:** Thysanoptera. **Trails:** *Teresópolis:* Cartão Postal (15.IX.2021), Mozart-Catão to Primavera (25.X.2021), 360 (26.X.2021), Mozart-Catão (27.X.2021), Barragem road (from Camping to Alojamento) (27.IV.2022), Suspensa (23.V.2022). Maia & Mascarenhas (2017) reported this gall in the Parque Nacional do Itatiaia (Southeastern Brazil).
Gall: on bud, cylindrical or fusiform, brown, with short brown trichomes, multichambered (Fig. 6G). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trail:** *Teresópolis:* Cartão Postal (15.IX.2021).
Gall: on leaf, globoid, brown, glabrous, one-chambered (Fig. 6H). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Cartão Postal (15.IX.2021), 360 (26.X.2021), Cartão Postal (24.V.2022).

***Mikania* cf. *paniculata* DC. (n = 4)**

Gall: on leaf midvein, globoid, intralaminar, green, glabrous, one-chambered (Fig. 6I). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Cartão Postal (15.IX.2021); *Guapimirim:* Araçari Camping (25.IV.2022).
Gall: on leaf petiole, fusiform, green, wrinkled, glabrous, one-chambered (Fig. 6J). **Gall-inducer:** Curculionidae (Coleoptera). **Trails:** *Teresópolis:* Cartão Postal (15.IX.2021); *Guapimirim:* Araçari Camping (25.IV.2022).
Gall: on leaf, globoid, green, with trichomes, one-chambered (Fig. 6K). **Gall-inducer:** Cecidomyiidae. **Trail:** *Guapimirim:* Araçari Camping (25.IV.2022).
Gall: on stem, fusiform, brown, glabrous, one-chambered. **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Cartão Postal (15.IX.2021); *Guapimirim:* Poço da Preguiça (29.III.2022), Poço Verde (31.III.2022).

First gall records on this host plant.

***Mikania* cf. *ternata* (Vell.) B.L. Rob. (n = 1)**

Gall: on leaf midvein, fusiform, green, glabrous, multichambered (Fig. 6L). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021), *Guapimirim:* Poço Verde (31.III.2022).

Goetz *et al.* (2018) reported the same gall on this plant in RS.

***Mikania* sp. 1 (n = 1)**

Gall: on leaf, globoid, brown, with trichomes (Fig. 6M). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Successors:** Collembola. **Trails:** *Teresópolis:* 360 (26.X.2021), Mozart-Catão (27.X.2021).

***Mikania* sp. 2 (n = 1)**

Gall: on leaf, conical, green, glabrous (Fig. 6N). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021).

***Mikania* sp. 3 (n = 3)**

Gall: on leaf, lenticular, red, glabrous (Fig. 6O). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trail:** *Teresópolis:* 360 (26.X.2021), Barragem to Casa do Pesquisador entrance (07.XII.2021).
Gall: on bud, cylindrical, green, glabrous (Fig. 6P). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* 360 (26.X.2021), *Guapimirim:* Mãe d'Água (29.III.2022).
Gall: on stem and leaf vein, fusiform, green or yellow, glabrous, one-chambered (Fig. 6Q). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* 360 (26.X.2021).

Several galls on congeneric species and morphospecies have been reported by Urso-Guimarães *et al.* (2017) in MS, Maia & Fernandes (2004), Carneiro *et al.* (2009) in MG, Maia (2001), Rodrigues *et al.* (2014) and Maia & Siqueira (2020) in RJ, Maia *et al.* (2014) in ES, Ansaloni *et al.* (2018) in SP, and Mendonça-Jr. *et al.* (2014) in RS.

***Piptocarpha quadrangularis* (Vell.) Baker (n = 1)**

Gall: on leaf, globoid, brown, with trichomes, one-chambered (Fig. 6R). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021).

First record of gall on this plant.

***Piptocarpha* sp. (n = 2)**

Gall: on leaf and petiole, globoid, green, glabrous, one-chambered (Fig. 6S). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Suspensa (26.XI.2021).
Gall: on stem, globoid, brown, furrowed, glabrous (Fig. 6T). **Gall-inducer:** Coleoptera. **Trail:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021).

Galls on congeneric species and morphospecies are known from GO (Araújo *et al.,* 2014), MG (Carneiro *et al.,* 2009; Coelho *et al.,* 2013), Parque Nacional do Itatiaia (Maia & Mascarenhas, 2017), SP (Maia *et al.,* 2008), and RS (Toma & Mendonça-Jr., 2013; Mendonça-Jr. *et al.,* 2014).

Asteraceae sp. 1 (n = 1)

Gall: on stem, fusiform, green, with brown trichomes, multichambered (Fig. 7A). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* 360 (26.X.2021).

Asteraceae sp. 2 (n = 1)

Gall: on leaf petiole, fusiform, green, with red micropubescence (Fig. 7B). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Cachoeira de Papel entrance (14.XI.2021).

Asteraceae sp. 3 (n = 1)

Gall: on leaf, lenticular, red, glabrous (Fig. 7C). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.XI.2021).

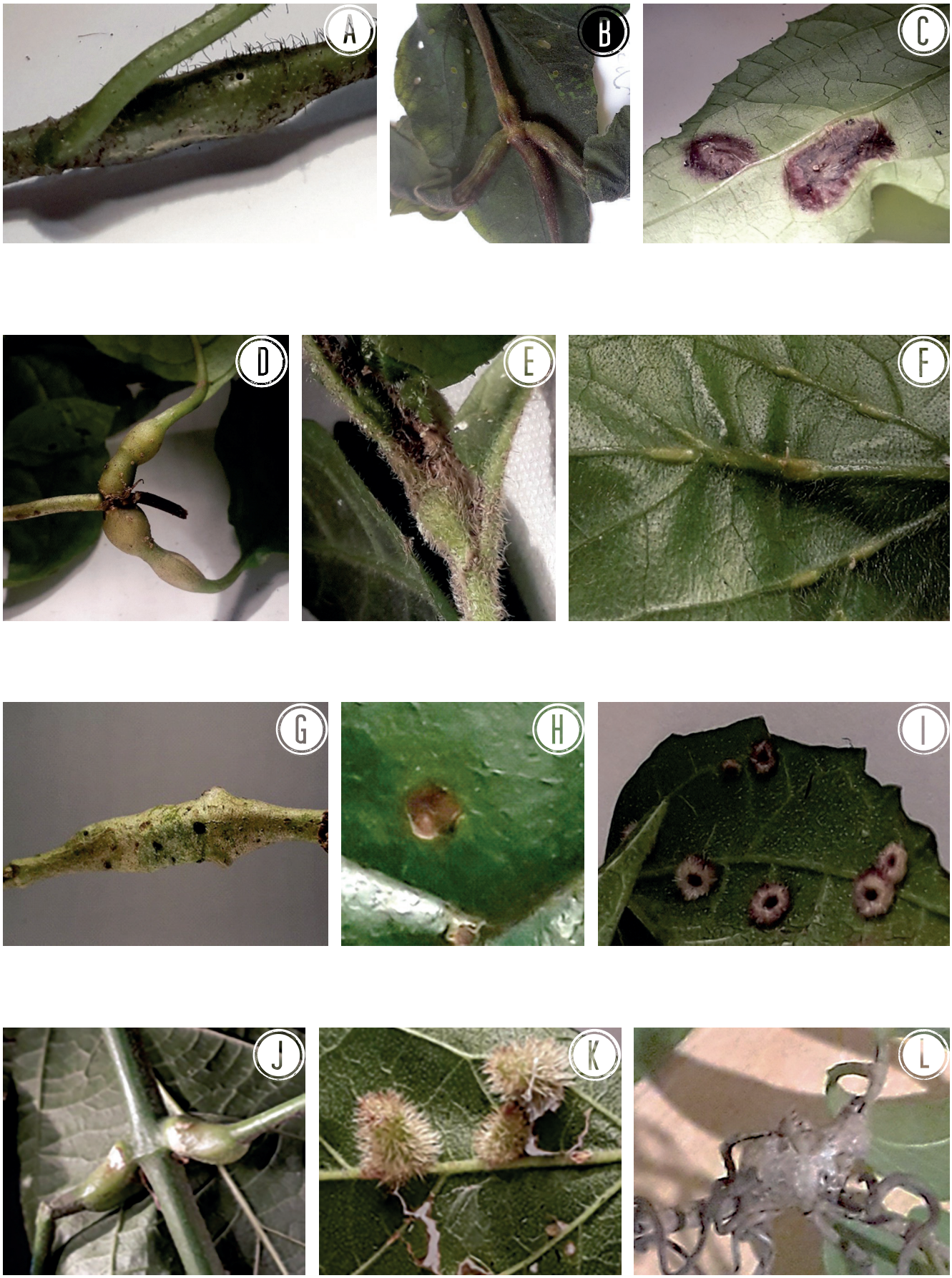

Figure 7. Insect galls of Parque Nacional da Serra dos Órgãos (RJ, Brazil): (A-F) On Asteraceae: (A) On Asteraceae sp. 1, stem gall, (B) On Asteraceae sp. 2, leaf petiole gall, (C) On Asteraceae sp. 3, leaf gall, (D) On Asteraceae sp. 4., leaf petiole gall, (E) On Asteraceae sp. 5, stem gall, (F) On Asteraceae sp. 6, leaf petiole gall, (G-L) On Bignoniaceae: (G) On *Adenocalymma* sp., stem gall, (H) On *Handroanthus serratifolius* (Vahl.) S. Grose, leaf gall, (I) On *Handroanthus* sp., leaf gall, (J-K) On *Stizophyllum perforatum* (Cham.) Miers: (J) leaf petiole gall, (K) leaf gall, (L) *Tanaecium pyramidatum* (Rich.) L.G. Lohmann, stem gall.

Asteraceae sp. 4 (n = 1)

Gall: on leaf petiole, fusiform, green, glabrous (Fig. 7D). **Gall-inducer:** not determined. **Trail:** *Guapimirim:* Araçari Camping (25.IV.2022).

Asteraceae sp. 5 (n = 1)

Gall: on stem, fusiform, green, with trichomes, one-chambered (Fig. 7E). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Cartão Postal (15.IX.2021).

Asteraceae sp. 6 (n = 1)

Gall: on leaf vein, fusiform, green, with trichomes (Fig. 7F). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Cartão Postal (15.IX.2021), 360 (26.X.2021), Barragem road (from Casa do Pesquisador to Alojamento (30.III.2022).

Bignoniaceae (n = 9)

***Adenocalymma* sp. (n = 1)**

Gall: on stem, brown, fusiform, glabrous, multichambered (Fig. 7G). **Gall-inducer:** not determined. **Trail:** *Guapimirim:* Poço da Capela (23.III.2022).

Galls on this plant genus were recorded by Araújo *et al.* (2012) in AM, Santos *et al.* (2012) in PE, Urso-Guimarães *et al.* (2017) in MS, and Rodrigues *et al.* (2014) in RJ.

***Handroanthus serratifolius* (Vahl.) S. Grose (n = 1)**

Gall: on leaf, lenticular, green, glabrous, one-chambered (Fig. 7H). **Gall-inducer:** not determined. **Parasitoids:** Hymenoptera. **Trail:** *Teresópolis:* 360 (26.X.2021).

Marinho *et al.* (2023) reported a stem gall on this plant in RN.

***Handroanthus* sp. (n = 1)**

Gall: on leaf, discoid, green, with red trichomes (Fig. 7I). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Barragem road (from Alojamento to Camping) (25.IV.2022).

Araújo *et al.* (2014) reported reported galls on this plant genus in GO, Urso-Guimarães *et al.* (2017) in MS, Fernandes *et al.* (2001) and Fernandes & Negreiros (2006) in MG.

***Lundia damazioi* C. DC. (n = 1)**

Gall: on leaf midvein, globoid to fusiform, brown, one or multichambered. **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Mozart-Catão (27.X.2021).

First record of gall on this plant genus.

***Stizophyllum perforatum* (Cham.) Miers. (n = 2)**

Gall: on leaf petiole and stem, fusiform, green, glabrous, one-chambered (Fig. 7J). **Gall-inducer:** not determined. **Successors:** Hemiptera. **Trail:** *Guapimirim:* Araçari Camping (25.IV.2022).

Gall: on leaf, conical, green, with trichomes, one-chambered (Fig. 7K). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Barragem road (from Alojamento to Camping) (25.IV.2022).

First gall records on this plant species.

Maia (2014) reported a stem gall on *S. riparium* (Kunth.) Sandwith in MG.

***Tanaecium pyramidatum* (Rich.) L.G. Lohmann (n = 1)**

Gall: on stem, globoid, brown, glabrous (Fig. 7L). **Gall-inducer:** not determined. **Trail:** *Guapimirim:* Poço da Capela (24.V.2022).

Urso-Guimarães *et al.* (2017) recorded a leaf gall on this same plant species in MS.

Bignoniaceae sp. 1 (n = 1)

Gall: on leaf, globoid, intralaminar, yellow, glabrous (Fig. 8A). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Poço do Castelo (06.XII.2021), Barragem to Casa do Pesquisador entrance (07.XII.2021).

Bignoniaceae sp. 2 (n = 1)

Gall: on stem and leaf petiole, fusiform, green, glabrous (Fig. 8B). **Gall-inducer:** not determined. **Trail:** *Guapimirim:* Poço Verde (31.III.2022).

Boraginaceae (n = 1)

***Varronia* sp. (n = 1)**

Gall: on bud, globoid, with an apical projection, green, with white microtrichomes, one-chambered (Fig. 8C). **Gall-inducer:** Lepidoptera. **Trail:** *Teresópolis:* Barragem road (from Alojamento to Camping) (25.IV.2022).

Several authors reported galls on *Varronia curassavica* Jacq. in RJ, ES, SP and SC as Maia (2001), Maia *et al.* (2008), Bregonci *et al.* (2010), Carvalho-Fernandes *et al.* (2016), Melo-Júnior *et al.* (2018), and Maia & Siqueira (2020). Marinho *et al.* (2023) recorded a leaf gall on *V. leucocephala* (Moric.) J.S. Mill. in CE.

Cactaceae (n = 1)

***Rhipsalis olivifera* N.P. Taylor & Zappi (n = 1)**

Gall: on leaf, globoid, intralaminar, brown, glabrous, one-chambered (Fig. 8D). **Gall-inducer:** Lepidoptera. **Trails:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (15.IX.2021), Suspensa (26.XI.2021).

First record of gall on this plant.

Mendonça-Jr. *et al.* (2014) reported a stem gall on *Rhipsalis* sp. in RS.

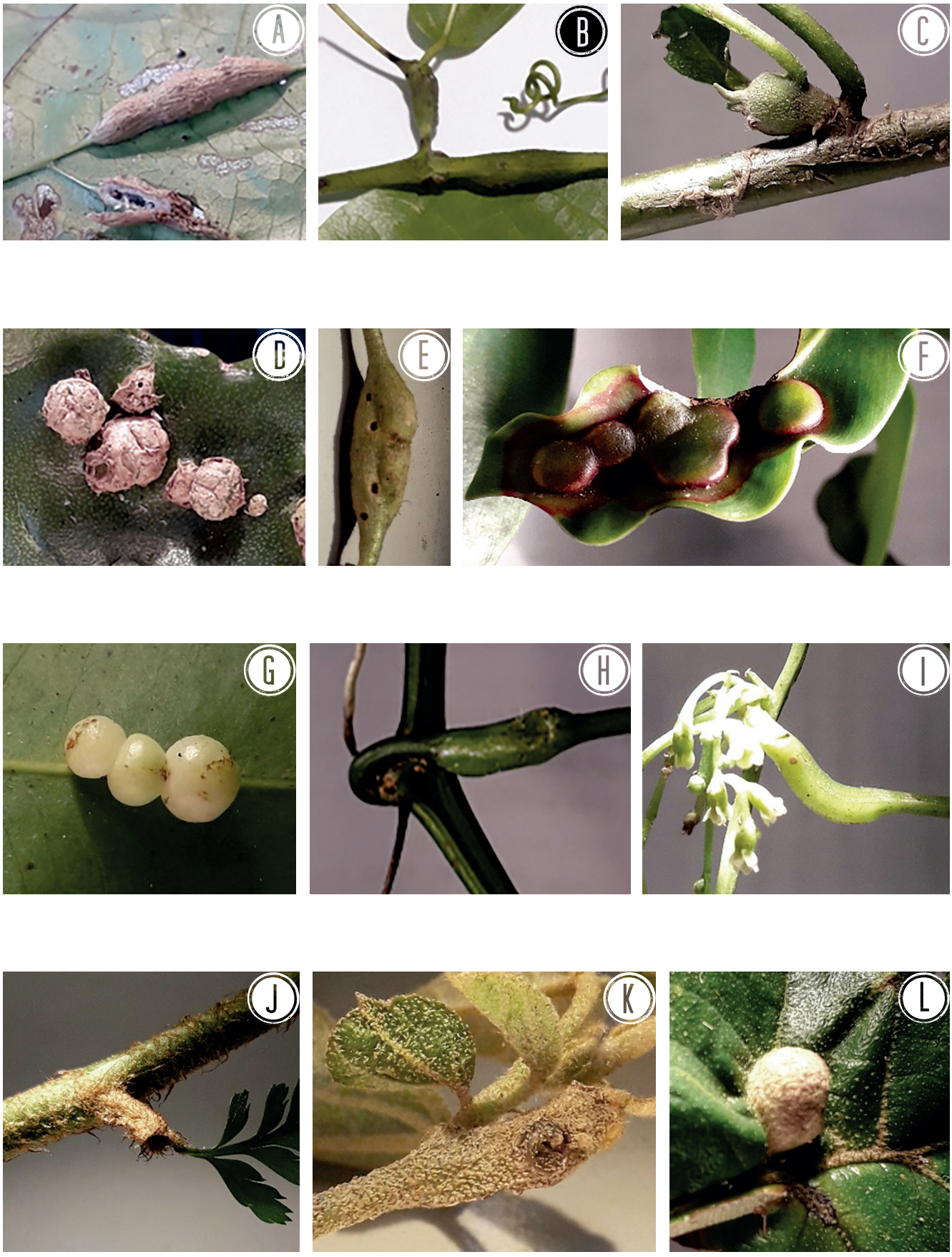

Figure 8. Insect galls of Parque Nacional da Serra dos Órgãos (RJ, Brazil): (A-B) On Bignoniaceae: (A) On Bignoniaceae sp. 1, leaf gall, (B) On Bignoniaceae sp. 2, stem and leaf petiole gall, (C) On *Varronia* sp. (Boraginaceae), bud gall, (D) On *Rhipsalis olivifera* N.P. Taylor & Zappi (Cactaceae), leaf gall, (E) On Celastraceae sp., leaf gall, (F-G) On Clusiaceae: (F) On *Clusia lanceolata* Camb., leaf gall, (G) On *Tovomitopsis paniculata* (Spreng.) Planch & Triana, leaf gall, (H) On *Cayaponia* sp. 2 (Curcubitaceae), leaf petiole, (I) On *Dioscorea laxiflora* Mart. ex Griseb. (Dioscoreaceae), leaf petiole, (J) On *Polybotrya* sp. (Dryopteridaceae), leaf petiole, (K-L) On Euphorbiaceae: (K) On *Croton echinocarpus* Müll. Arg., stem gall, (L) On *Croton floribundus* Spreng., leaf gall.

Celastraceae (n = 1)

Celastraceae sp. (n = 1)

Gall: on stem, fusiform, brown, glabrous, multichambered (Fig. 8E). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Primavera (15.IX.2021).

Chrysobalanaceae (n = 1)

***Licania spicata* Hook. f. (n = 1)**

Gall: on leaf, globoid, brown, glabrous. **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Mozart Catão to Primavera (25.X.2021), 360 (26.X.2021), Mozart Catão (25.V.2022).

Maia *et al.* (2008) reported leaf and stem galls on *Licania spicata* Hook. f. in SP. Galls on this plant genus are known from AM (Almada & Fernandes, 2011), GO (Santos *et al.,* 2010; Araújo *et al.,* 2014) and MG (Maia & Fernandes, 2004, Coelho *et al.,* 2013).

Clusiaceae (n = 2)

***Clusia lanceolata* Camb. (n = 1)**

Gall: on leaf, intralaminar, globoid, green ou red, glabrous, one-chambered (Fig. 8F). **Gall-inducer:** *Clusiamyia nitida* Maia, 1997 (Cecidomyiidae). **Trail:** *Guapimirim:* Museu Von Martius (27.IV.2022).

Maia (1996) described the gall-inducing species from Maricá, RJ. Until this moment, it was known only from the type-locality.

Galls on other congeneric species are morphospecies are known from AM (Almada & Fernandes, 2011), PE (Santos *et al.,* 2012), GO (Araújo *et al.,* 2012, 2015), MS (Julião *et al.,* 2014), ES (Bregonci *et al.,* 2010; Maia *et al.,* 2014), RJ (Maia, 2001; Oliveira & Maia, 2005; Carvalho-Fernandes *et al.,* 2016), SC (Arriola & Melo-Júnior, 2016; Melo-Júnior *et al.,* 2018).

***Tovomitopsis paniculata* (Spreng.) Planch & Triana (n = 1)**

Gall: on leaf, globoid, yellow, glabrous, one-chambered (Fig. 8G). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trail:** *Teresópolis:* Suspensa (25.XI.2021).

First record of gall on this plant genus.

Curcubitaceae (n = 2)

***Cayaponia* sp. 1 (n = 1)**

Gall: on leaf petiole, fusiform green, glabrous, one-chambered. **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trail:** *Guapimirim:* Alameda Von Spix (25. IV.2022).

***Cayaponia* sp. 2 (n = 1)**

Gall: on stem and leaf petiole, fusiform, green, glabrous, multichambered (Fig. 8H). **Gall-inducer:** Cecidomyiidae. **Trail:** *Guapimirim:* Museu Von Martius (27.IV.2022).

Toma & Mendonça-Jr. (2013) and Maia & Mascarenhas (2017) reported galls on this plant genus.

Dioscoreaceae (n = 1)

***Dioscorea laxiflora* Mart. ex Griseb (n = 1)**

Gall: on leaf petiole and stem, fusiform, green, glabrous, one-chambered (Fig. 8I). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trail:** *Guapimirim:* Circular (25.IV.2022), Araçari Camping (25.IV.2022).

First record of gall on this plant species.

Maia *et al.* (2008), Maia & Mascarenhas (2017) and Goetz *et al.* (2018) reported galls on other species of *Dioscorea* L. in the Parque Nacional do Itatiaia and RS, respectively.

Dryopteridaceae (n = 1)

***Polybotrya* sp. (n = 1)**

Gall: on leaf petiole, fusiform, brown, glabrous (Fig. 8J). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Suspensa (26.XI.2021).

First record of gall on this plant genus.

Euphorbiaceae (n = 4)

***Croton echinocarpus* Müll. Arg. (n = 1)**

Gall: on stem, fusiform, brown, with short trichomes, one-chambered (Fig. 8K). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Primavera (13.IX.2021), Barragem to Cachoeira de Papel entrance (14.IX.2021), Centro de Operações (28.III.2022).

First record of gall on this plant species.

Many authors reported galls on other congeneric species and morphospecies as Almada & Fernandes (2011) in AM, Marinho *et al.* (2023) in RN, CE and PB, Urso-Guimarães *et al.* (2017) in MS, Vieira *et al.* (2018) in BA, Carneiro *et al.* (2009), Maia & Fernandes (2004), Malves & Frieiro-Costa (2012) in MG, Carvalho-Fernandes *et al.* (2016) in RJ, Maia & Mascarenhas (2017) in the Parque Nacional do Itatiaia, Ribeiro *et al.* (2019) and Urso-Guimarães *et al.* (2003) in SP.

***Croton floribundus* Spreng. (n = 1)**

Gall: on leaf, globoid, yellow, glabrous, one-chambered (Fig. 8L). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trail:** *Teresópolis:* Centro de Operações (28.III.2022).

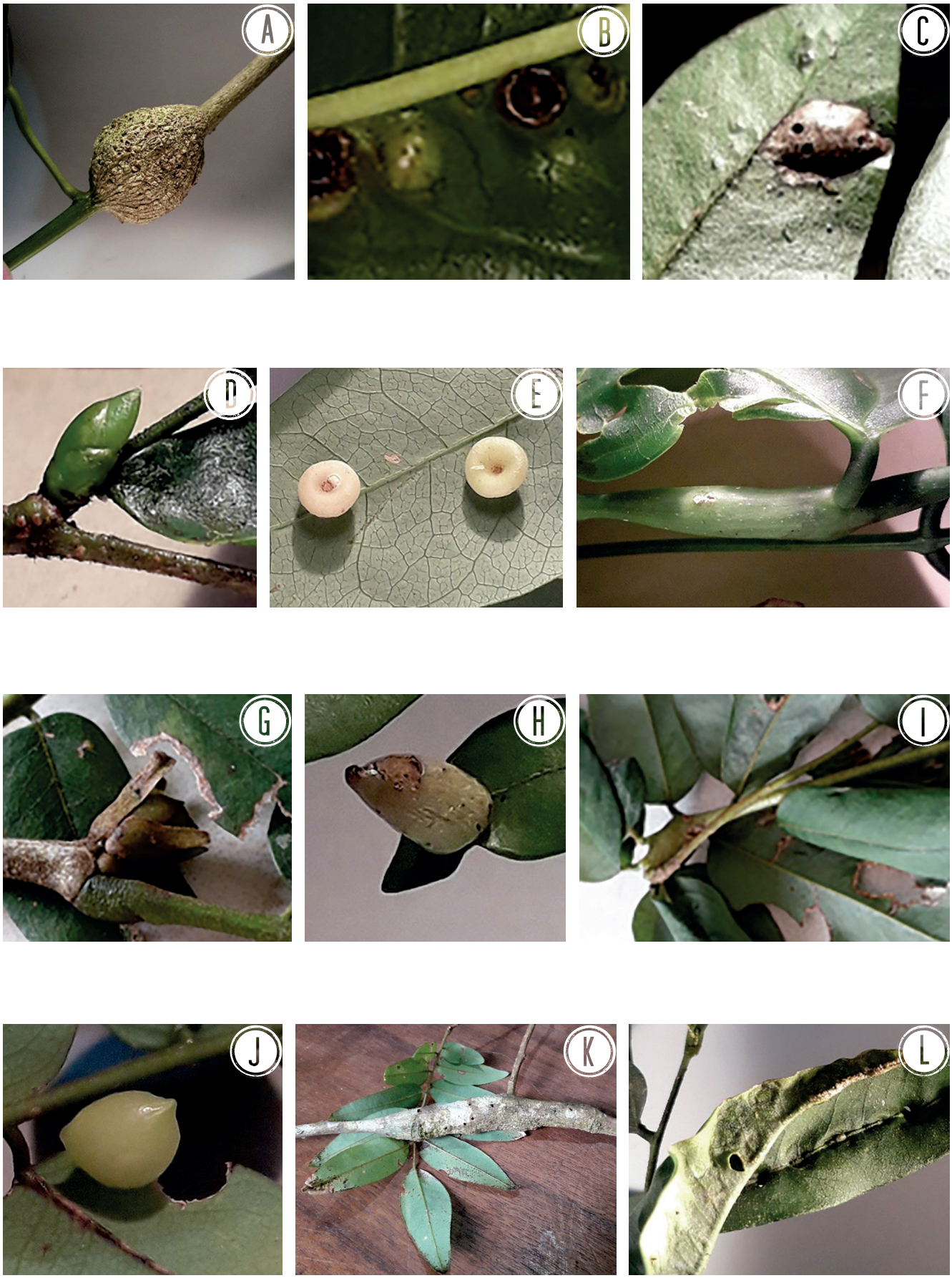

Figure 9. Insect galls of Parque Nacional da Serra dos Órgãos (RJ, Brazil): (A-B) On Euphorbiaceae: (A) On *Plukenetia serrata* (Vell.) L.J. Gillespie, stem gall, (B) On *Sapium glandulosum* (L.) Morong, leaf gall, (C-L) On Fabaceae: (C-D) On *Copaifera trapezifolia* Hayne: (C) leaf gall, (D) bud gall, (E) On *Copaifera* sp., leaf gall, (F) On *Dahstedtia pinnata* (Benth.) Malme, stem gall, (G-I) On *Dalbergia foliolosa* Benth.: (G) bud gall, (H) leaf gall, (I) stem gall, (J-K) On *Dalbergia* sp. 1: (J) leaf gall, (K) stem gall, (L) On *Dalbergia* sp. 2, leaf gall.

Maia & Fernandes (2004) reported a similar gall on this plant in MG. Several authors have reported other galls on *C. floribundus:* Maia *et al.,* 2014 (ES), Maia & Mascarenhas (2022) in MG, Maia & Mascarenhas (2017) in the Parque Nacional do Itatiaia and Santos & Ribeiro (2015) in PR.

***Plukenetia serrata* (Vell.) L.J. Gillespie (n = 1)**

Gall: on stem, globoid, brown, glabrous, multichambered (Fig. 9A). Gall-inducer Coleoptera. **Trail:** *Teresópolis:* 360 (26.X.2021).

First record of gall on this plant genus.

***Sapium glandulosum* (L.) Morong (n = 1)**

Gall: on leaf, globoid, intralaminar, green, glabrous (Fig. 9B). **Gall-inducer:** Hemiptera. **Trail:** *Teresópolis:* Barragem road (from Alojamento to Camping) (25. IV.2022).

Julião *et al.* (2014) reported this gall in AM and Toma & Mendonça-Jr. (2013) in RS. Urso-Guimarães *et al.* (2017) recorded other leaf gall on this host plant.

Fabaceae (n = 28)

***Copaifera trapezifolia* Hayne (n = 2)**

Gall: on leaf, lenticular, brown, glabrous, multichambered (Fig. 9C). **Gall-inducer:** not determined. **Trail:** *Guapimirim:* Mãe d'Água (29.III.2022).
Gall: on bud, conical, green, glabrous, one-chambered (Fig. 9D). **Gall-inducer:** Cecidomyiidae. **Trail:** *Guapimirim:* Mãe d'Água (29.III.2022).

First record of gall on this plant species.

***Copaifera* sp. (n = 1)**

Gall: on leaf, discoid, concave, yellow, glabrous, one-chambered (Fig. 9E). **Gall-inducer:** Cecidomyiidae. **Trail:** *Guapimirim:* Alameda Von Spix (25.V.2022).

Galls on congeneric species and morphospecies were reported by Carvalho & Mota (2018) in AM, Ascendino & Maia (2018) in MS, Santos *et al.* (2011) in PE, Santos *et al.* (2012) and Araújo *et al.* (2015) in GO, Urso-Guimarães *et al.* (2017) in MS, Santos *et al.* (2018), Nogueira *et al.* (2016), Vieira *et al.* (2018) and Silva *et al.* (2018) in BA, Fernandes *et al.* (1997), Gonçalves-Alvim & Fernandes (2001), Maia & Fernandes (2004), Coelho *et al.* (2009), Luz *et al.* (2012) and Maia (2013a) in MG, and Urso-Guimarães & Scareli-Santos (2006) and Ribeiro *et al.* (2019) in SP.

***Dahlstedtia pinnata* (Benth.) Malme (n = 1)**

Gall: on stem, fusiform, green, glabrous (Fig. 9F). **Gall-inducer:** not determined. **Trail:** *Guapimirim:* Ponte Velha (29.III.2022).

Maia & Mascarenhas (2017) reported this same gall in the Parque Nacional do Itatiaia.

***Dalbergia foliolosa* Benth. (n = 3)**

Gall: on bud, globoid, imbricated, brown, glabrous, one-chambered (Fig. 9G). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Casa do Pesquisador (13.IX.2021), Primavera (15.IX.2021), Suspensa (25.XI.2021).
Gall: on leaf, conical, yellow, glabrous, one-chambered (Fig. 9H). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Primavera (15.IX.2021), Suspensa (25. XI.2021); *Guapimirim:* Alameda Von Spix (25.V. 2022).
Gall: on stem, fusiform, green, glabrous, one-chambered (Fig. 9I). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Primavera (15.IX.2021), Suspensa (25.XI.2021), Bosque Santa Helena (06.XII.2021).

Maia & Mascarenhas (2017) reported galls on stem and leaf of this plant species in the Parque Nacional do Itatiaia. The stem gall is the same recorded here, the others are different morphotypes.

***Dalbergia* sp. 1 (n = 2)**

Gall: on leaf, globoid, yellow, glabrous, one-chambered (Fig. 9J). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021).
Gall: on stem, fusiform, brown, glabrous, multichambered (Fig. 9K). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021).

***Dalbergia* sp. 2 (n = 2)**

Gall: on leaf, fold, green, glabrous, one-chambered (Fig. 9L). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* 360 (26.X.2021), Barragem road (from Casa do Pesquisador to Alojamento (30.III.2022).
Gall: on stem, fusiform, brown, glabrous, one-chambered (Fig. 10A). **Gall-inducer:** not determined. **Trail:** *Guapimirim:* Araçari Camping (25.IV.2022).

Galls on other congeneric species and morphospecies have been reported in AM (Almada & Fernandes, 2011; Julião *et al.,* 2014), GO (Araújo *et al.,* 2015), MG (Fernandes *et al.,* 2001; Carneiro *et al.,* 2009; Luz *et al.,* 2012; Costa & Araújo, 2019), RJ (Maia, 2001), ES (Maia, 2020), SP (Maia *et al.,* 2008), SC (Arriola *et al.,* 2015), and RS (Mendonça-Jr. *et al.,* 2014).

***Inga barbata* Benth. (n = 2)**

Gall: on stem, fusiform, brown, with microtrichomes, one-chambered (Fig. 10B). **Gall-inducer:** Curculionidae (Coleoptera). **Trails:** *Teresópolis:* Mozart-Catão to Primavera (25.X.2021), 360 (26.X.2021), Mozart-Catão (27.X.2021).
Gall: on leaf, globoid, extralaminar, green, with brown trichomes, one-chambered (Fig. 10C). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* 360 (26.X.2021).

Maia & Mascarenhas (2017) reported the same leaf gall in the Parque Nacional do Itatiaia.

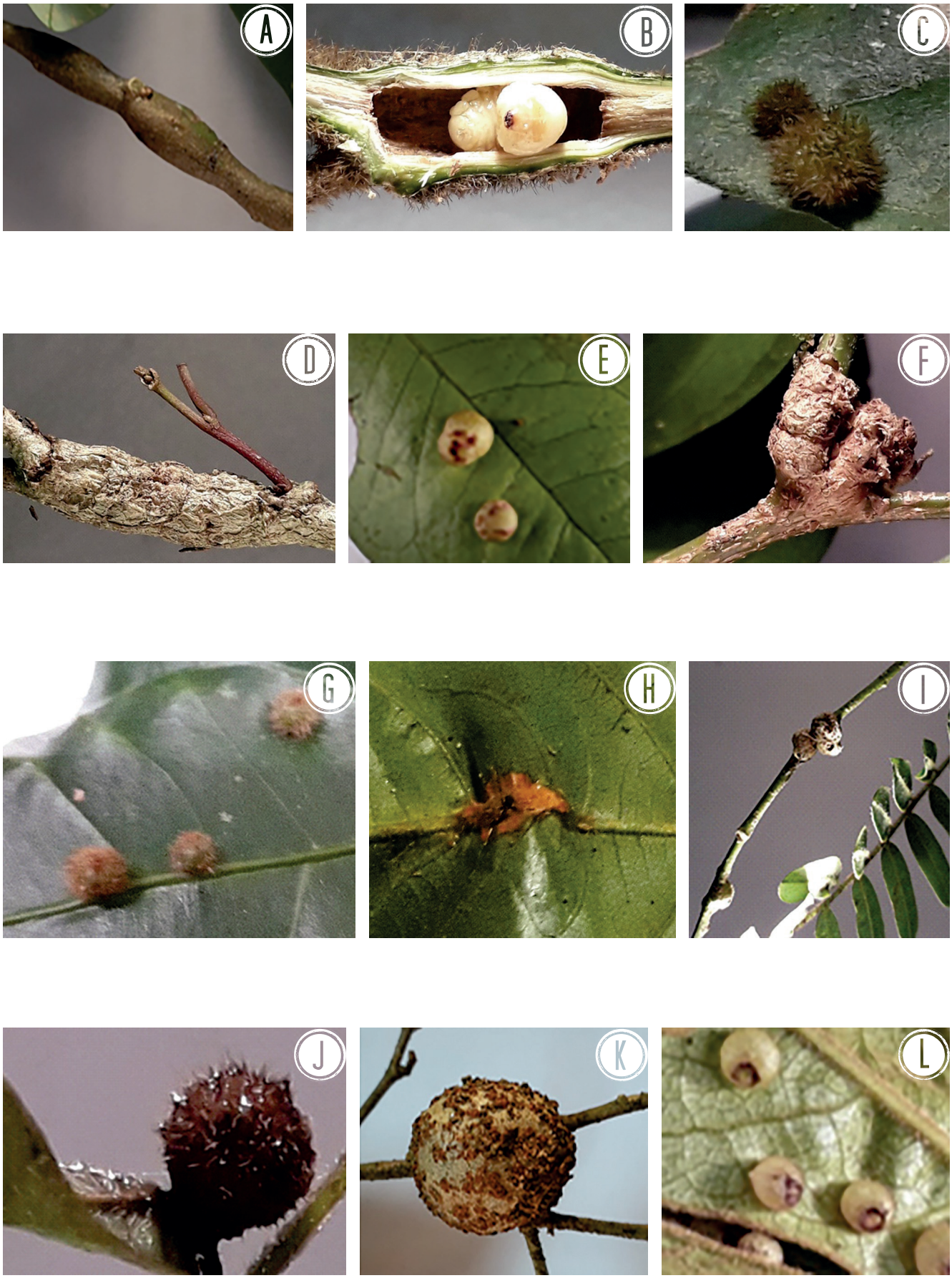

Figure 10. Insect galls of Parque Nacional da Serra dos Órgãos (RJ, Brazil): (A-L) On Fabaceae: (A) On *Dalbergia* sp. 2, stem gall, (B-C) On *Inga barbata* Benth.: (B) stem gall, (C) leaf gall, (D-E) *Inga lanceifolia* Benth., (D) stem gall, (E) leaf gall, (F-G) On *Inga marginata* Willd.: (F) bud gall, (G) leaf gall, (H) On *Inga* sp., leaf vein gall, (I-K) On *Machaerium nyctitans* (Vell.) Benth.: (I) stem gall, (J) bud gall (with trichomes), (K) bud gall (glabrous), (L) On *Machaerium oblongifolium* Vogel., leaf gall.

***Inga lanceifolia* Benth. (n = 2)**

Gall: on stem, fusiform, brown, glabrous, one-chambered (Fig. 10D). **Gall-inducer:** Curculionidae (Coleoptera). **Trail:** *Teresópolis:* Cartão Postal (15.IX.2021).
Gall: on leaf, globoid, yellow, glabrous (Fig. 10E). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* 360 (26.X.2021), Mozart-Catão (27.X.2021).

First records of galls on this plant species.

***Inga marginata* Willd. (n = 2)**

Gall: on bud, globoid, brown, glabrous, multichambered (Fig. 10F). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Cachoeira Ceci-Peri (13.IX.2021), Barragem road (from Alojamento to Camping) (25.IV.2022).
Gall: on leaf, globoid, brown, with trichomes (Fig. 10G). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* Cachoeira Ceci-Peri (13.IX.2021), Mozart-Catão to Primavera (25.X.2021), Mozart-Catão (27.X.2021), Barragem road (from Alojamento to Camping) (25.IV.2022).

Maia & Mascarenhas (2017) reported the same leaf gall on this plant in the Parque Nacional do Itatiaia. Other galls were recorded by Julião *et al.* (2014) in AM, Araújo *et al.* (2015) in GO, and Goetz *et al.* (2018) in RS.

***Inga sessilis* (Vell.) Mart. (n = 1)**

Gall: on leaf, cylindrical, green, glabrous. **Gall-inducer:** not determined. **Trail:** *Teresópolis:* 360 (26.X.2021).

Maia & Mascarenhas (2017) reported the same leaf gall on this plant in the Parque Nacional do Itatiaia.

***Inga* sp. (n = 1)**

Gall: on leaf vein, fusiform, brown, glabrous (Fig. 10H). **Gall-inducer:** not determined. **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.XI.2021), Bosque Santa Helena (26.XI.2021).

Several galls are known on *Inga* Mill. species and morphospecies in AM (Maia, 2011; Almada & Fernandes, 2011; Silva *et al.,* 2011; Araújo *et al.,* 2012; Carvalho & Mota, 2018), GO (Bergamini *et al.,* 2017), MS (Julião *et al.,* 2002, Urso-Guimarães *et al.,* 2017, Ascendino & Maia, 2018), PE (Santos *et al.,* 2011, 2012), BA (Silva *et al.,* 2018), MG (Urso-Guimarães *et al.,* 2003; Maia & Fernandes, 2004; Fernandes & Negreiros, 2006), RJ (Maia, 2001; Maia & Silva, 2016), and RS (Goetz *et al.,* 2018).

***Machaerium nyctitans* (Vell.) Benth. (n = 3)**

Gall: on stem, globoid, brown, glabrous (Fig. 10I). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Mozart-Catão (27.X.2021), Barragem to Casa do Pesquisador entrance (07.XII.2021).
Gall: on bud, globoid, reddish, with trichomes, one-chambered (Fig. 10J). **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* Suspensa (25.XI.2021), Bosque Santa Helena (26.XI.2021), Poço do Castelo (06.XII.2021), Barragem to Casa do Pesquisador entrance (07.XII.2021), Poço do Beija-Flor (07.XII.2021).
Gall: on bud, globoid, rough, brown, glabrous (Fig. 10K). **Gall-inducer:** not determined. **Parasitoids:** Hymenoptera. **Trail:** *Teresópolis:* Bosque Santa Helena (26.XI.2021).

Maia & Mascarenhas (2017) reported two gall morphotypes on stem and bud of this plant in the Parque Nacional do Itatiaia.

***Machaerium oblongifolium* Vogel (n = 1)**

Gall: on leaf and bud, globoid, extralaminar, yellow, with short trichomes, one-chambered (Fig. 10L). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* Cartão Postal (15.IX.2021), 360 (26.X.2021), Mozart Catão (27.X.2021); *Guapimirim:* Ponte Velha (29.III.2022).

First gall record on this plant species.

Galls on other species and morphospecies of *Machaerium* Pers. are known from AM (Almada & Fernandes, 2011), GO (Araújo *et al.,* 2015), MS (Urso-Guimarães *et al.,* 2017), MG (Fernandes *et al.,* 1988, 2001; Fernandes & Negreiros, 2006; Luz *et al.,* 2012; Malves & Frieiro-Costa, 2012; Coelho *et al.,* 2013; Maia, 2013a; Gonçalves-Alvim & Fernandes, 2001; Maia & Mascarenhas, 2022), ES (Maia *et al.,* 2014), RJ (Carvalho-Fernandes *et al.,* 2016; Maia & Carvalho-Fernandes, 2016; Maia & Siqueira, 2020), SP (Maia *et al.,* 2008), PR (Santos & Ribeiro, 2015), and RS (Mendonça-Jr. *et al.,* 2014).

***Myrocarpus frondosus* Alemão (n = 1)**

Gall: on leaf, lenticular, green, glabrous (Fig. 11A). **Gall-inducer:** not determined. **Trail:** *Guapimirim:* Poço Verde (31.III.2022).

First record of galls on this plant genus.

***Pseudopiptadenia inaequalis* (Benth.) Rauschert (n = 2)**

Gall: on leaf, lenticular, green, glabrous (Fig. 11B). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Mozart Catão (27.X.2021), Barragem to Casa do Pesquisador entrance (07.XII.2021); *Guapimirim:* Ponte Velha (29.III.2022).
Gall: on stem, globoid, brown, glabrous, one-chambered (Fig. 11C). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Mozart Catão (27.X.2021), Barragem to Casa do Pesquisador entrance (07.XII.2021).

First records of galls on this plant genus.

***Senegalia* sp. 1 (n = 1)**

Gall: on stem, fusiform, brown, glabrous (Fig. 11D). **Gall-inducer:** not determined. **Trail:** *Guapimirim:* Recanto das Ruínas (28.III.2022).

***Senegalia* sp. 2 (n = 1)**

Gall: on bud, globoid, green, glabrous (Fig. 11E). **Gall-inducer:** Cecidomyiidae. **Trail:** *Guapimirim:* Mãe d'Água (29.III.2021).

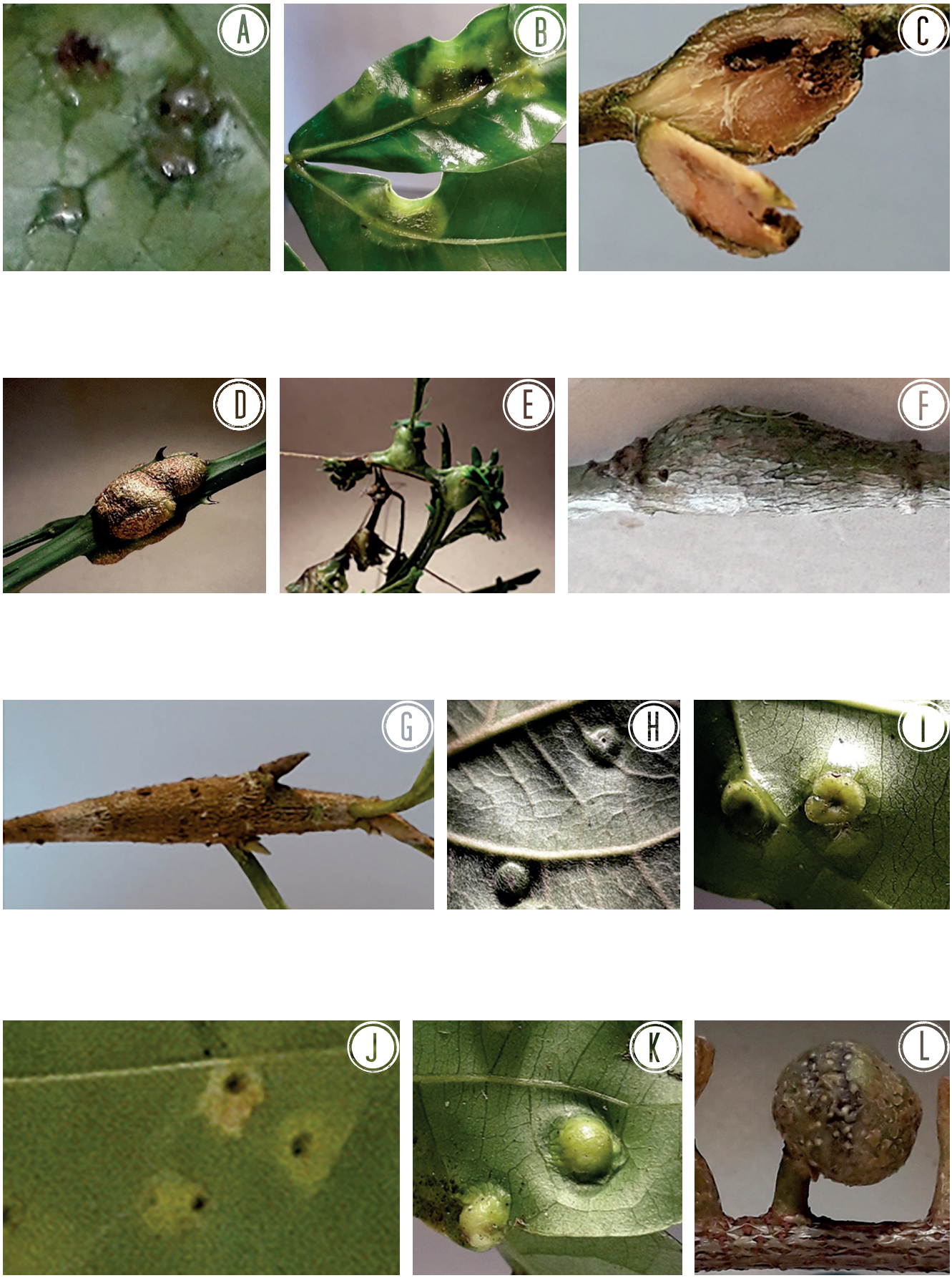

Figure 11. Insect galls of Parque Nacional da Serra dos Órgãos (RJ, Brazil): (A-I) On Fabaceae: (A) On *Myrocarpus frondosus* Alemão, leaf gall, (B-C) On *Pseudopiptadenia inaequalis* (Benth.) Rauschert: (B) leaf gall, (C) stem gall, (D) On *Senegalia* sp. 1, stem gall, (E) On *Senegalia* sp. 2, bud gall, (F) On *Nematanthus crassifolius* (Schott.) Wiehler (Gesneriaceae), stem gall, (G-K) On Lauraceae: (G-H) On *Ocotea* cf. *elegans* Mez.: (G) stem gall, (H) leaf gall, (I) On *Ocotea* sp. 1, stem gall, (J) On *Ocotea* sp. 2, leaf gall, (K) On Lauraceae sp., leaf gall, (L) On *Struthanthus* sp. (Loranthaceae), aerial root gall.

Carvalho-Fernandes *et al.* (2016) and Maia & Souza (2013) reported galls on this plant genus in RJ.

Galls on *Senegalia* spp. are known from BA (Silva *et al.,* 2018; Santana *et al.,* 2020), and RJ (Maia & Souza, 2013; Maia & Carvalho-Fernandes, 2016; Carvalho-Fernandes *et al.,* 2016; Maia & Siqueira, 2020).

Gesneriaceae (n = 1)

***Nematanthus crassifolius* (Schott.) Wiehler (n = 1)**

Gall: on stem, fusiform, brown, glabrous (Fig. 11F). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Suspensa (26.XI.2021).

First gall record on this plant genus.

Maia *et al.* (2008) reported a stem gall on *Nematanthus fritschii* Hoehne in SP.

Lauraceae (n = 5)

***Ocotea* cf. *elegans* Mez (n = 2)**

Gall: on stem, fusiform, brown, glabrous, multichambered (Fig. 11G). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Suspensa (25.XI.2021).
Gall: on leaf, globoid, intralaminar, green, with white trichomes, one-chambered (Fig. 11H). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Suspensa (25.XI.2021), Centro de Operações to Camping (28.III.2022).

Flor *et al.* (2018) reported the same stem gall on *Ocotea elegans* in RJ.

***Ocotea* sp. 1 (n = 1)**

Gall: on leaf, globoid, intralaminar, green, glabrous, one-chambered (Fig. 11I). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Suspensa (26.XI.2021), Barragem to Casa do Pesquisador entrance (07.XII.2021).

***Ocotea* sp. 2 (n = 1)**

Gall: on leaf, globoid, intralaminar, green, glabrous (Fig. 11J). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* 360 (26.X.2021), Mozart-Catão to Primavera (25.X.2021), Mozart-Catão (27.X.2021, 25.V.2022).

Several galls on congeneric species and morphospecies are known from AM (Almada & Fernandes, 2011; Araújo *et al.,* 2012; Julião *et al.,* 2014), PE (Santos *et al.,* 2011, 2012), MS (Julião *et al.,* 2002), BA (Vieira *et al.,* 2018, Santana *et al.,* 2020), MG (Fernandes *et al.,* 2001; Maia & Fernandes, 2004; Carneiro *et al.,* 2009; Coelho *et al.,* 2009, 2013), ES (Bregonci *et al.,* 2010; Maia *et al.,* 2014), RJ (Monteiro *et al.,* 1994; Rodrigues *et al.,* 2014; Carvalho-Fernandes *et al.,* 2016; Flor *et al.,* 2018 Maia & Mascarenhas, 2017; Maia & Siqueira, 2020), SP (Lima *et al.,* 2000; Maia *et al.,* 2008; Ribeiro *et al.,* 2019; Saito & Urso-Guimarães, 2012), SC (Arriola & Melo-Júnior, 2016; Melo-Júnior *et al.,* 2018), and RS (Toma & Mendonça-Jr., 2013; Mendonça-Jr. *et al.,* 2014).

Lauraceae sp. (n = 1)

Gall: on leaf, concave, yellow, glabrous, one-chambered (Fig. 11K). **Gall-inducer:** Hemiptera. **Trail:** *Teresópolis:* Suspensa (26.XI.2021).

Loranthaceae (n = 1)

***Struthanthus* sp. (n = 1)**

Gall: on aerial roots, globoid, brown, glabrous, one-chambered (Fig. 11L). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021).

Galls on congeneric species are known from other localities, as GO (Araújo *et al.,* 2011, 2015), Parque Nacional do Itatiaia (Maia & Mascarenhas, 2017) and RJ (Maia, 2001).

Malpighiaceae (n = 9)

***Bunchosia* cf. *maritima* (Vell.) J.F. Macbr (n = 1)**

Gall: on stem, fusiform, woody, brown, glabrous (Fig. 12A). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trail:** *Guapimirim:* Ponte Velha (29.III.2022).

First gall record on this plant species.

***Bunchosia* sp. (n = 3)**

Gall: on leaf, globoid, extralaminar, yellow, glabrous, multichambered (Fig. 12B). **Gall-inducer:** not determined. **Trail:** *Guapimirim:* Circular (27.IV.2022).
Gall: on apical bud, fusiform to globoid, yellow or brown, glabrous, one-chambered (Fig. 12C). **Gall-inducer:** not determined. **Trail:** *Guapimirim:* Circular (27.IV.2022).
Gall: on leaf petiole, fusiform, brown, glabrous, one-chambered (Fig. 12D). **Gall-inducer:** not determined. **Trail:** *Guapimirim:* Circular (27.IV.2022).

Galls on other congeneric species were reported by Urso-Guimarães *et al.* (2017) in MS.

***Heteropterys* sp. 1 (n = 1)**

Gall: on leaf petiole and midvein base, fusiform, green, glabrous, multichambered (Fig. 12E). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Barragem road (from Alojamento to Camping) (25.IV.2022), *Guapimirim:* Museu Von Martius (27.IV.2022).

***Heteropterys* sp. 2 (n = 1)**

Gall: on stem, fusiform, brown, glabrous, one-chambered (Fig. 12F). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Barragem to Casa do Pesquisador entrance (07.XII.2021).

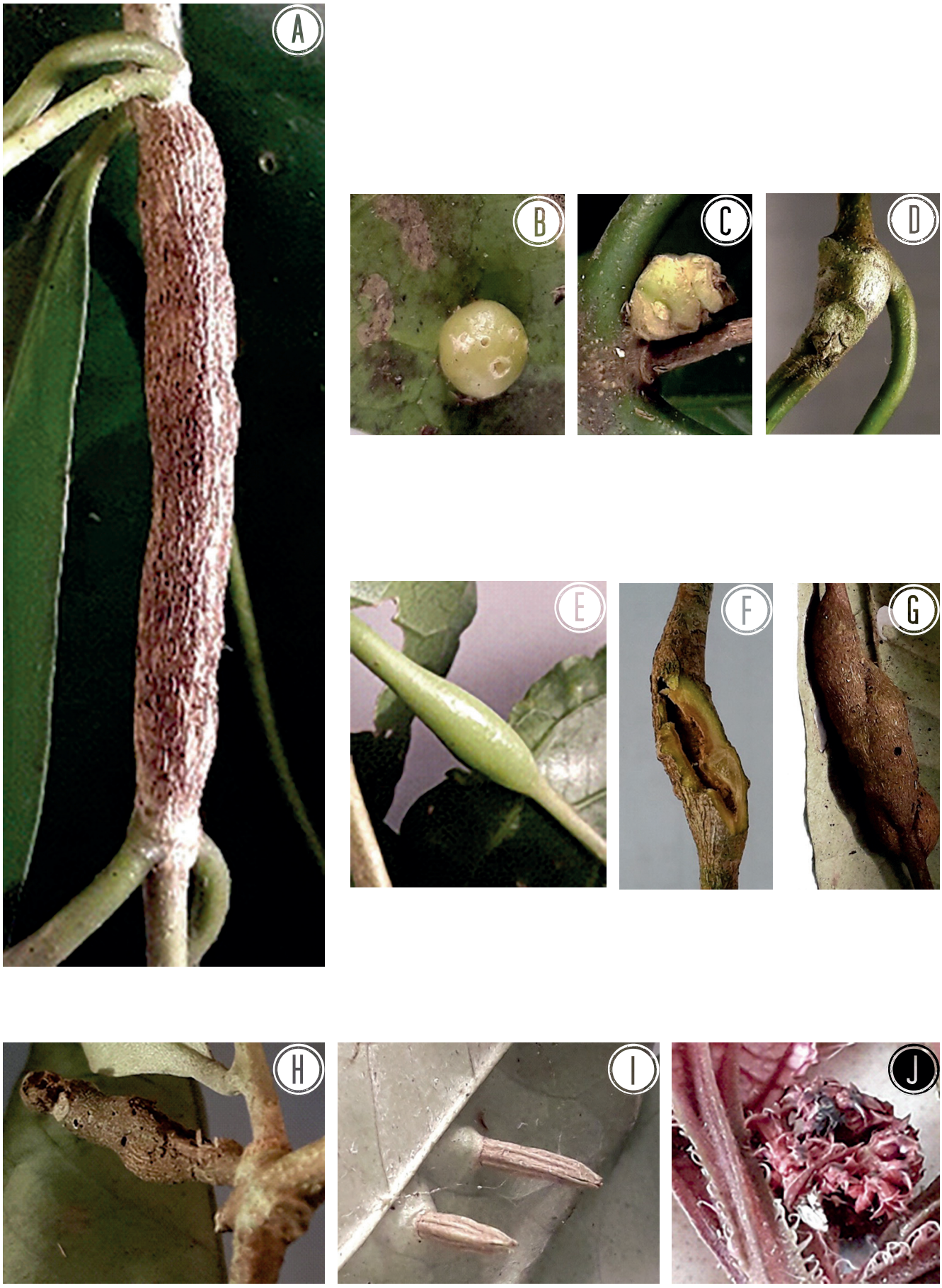

Figure 12. Insect galls of Parque Nacional da Serra dos Órgãos (RJ, Brazil): (A-I) On Malpighiaceae: (A) On *Bunchosia* cf. *maritima* (Vell.) J.F. Macbr., stem gall, (B-D) On *Bunchosia* sp. 1, (B) leaf gall, (C) bud gall, (D) petiole gall, (E) On *Heteropterys* sp. 1, leaf petiole gall, (F) On *Heteropterys* sp. 2, stem gall, (G-I) On *Niedenzuella poeppigiana* (A. Juss.) W.R. Anderson: (G) stem gall, (H) bud gall, (I) leaf gall, (J) On *Bertolonia acuminata* Gardner (Melastomataceae), bud gall.

Galls on this plant genus were reported by Araújo *et al.* (2015) in GO, Fernandes *et al.* (1997) and Gonçalves-Alvim & Fernandes (2001) in MG, Maia (2001) and Maia & Souza (2013) in RJ, and Maia & Mascarenhas (2017) in the Parque Nacional do Itatiaia, and Urso-Guimarães & Scareli-Santos (2006) in SP.

***Niedenzuella poeppigiana* (A. Juss.) W.R. Anderson (n = 3)**

Gall: on stem, fusiform, woody, brown, glabrous, multichambered (Fig. 12G) **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Primavera (13.IX.2021), Cartão Postal (15.IX.2021), Poço do Beija-Flor (07.XII.2021).
Gall: on bud, fusiform, brown, glabrous, multichambered (Fig. 12H). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Mozart-Catão (27.X.2021).
Gall: on leaf, conical, furrowed, brown, glabrous, one-chambered (Fig. 12I). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Barragem road (from Casa do Pesquisador to Alojamento) (30.III.2022); *Guapimirim:* Circular (26.IV.2022).

First records of gall on this plant species.

Maia & Mascarenhas (2017) reported a leaf gall on other congeneric species in the Parque Nacional do Itatiaia.

Malvaceae (n = 1)

***Eriotheca* sp. (n = 1)**

Gall: on leaf, lenticular, yellow, glabrous. **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Suspensa (25.XI.2021), Bosque Santa Helena (26.XI.2021).

Galls on this plant genus were reported in GO (Santos *et al.,* 2012; Araújo *et al.,* 2014), MG (Gonçalves-Alvim & Fernandes, 2001) and SP (Saito & Urso-Guimarães, 2012).

Melastomataceae (n = 38)

***Bertolonia acuminata* Gardner (n = 1)**

Gall: on bud, globoid, rough, red, glabrous (Fig. 12J). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Suspensa (26.XI.2021), Bosque Santa Helena (26.XI.2021).

First gall record on this plant genus.

***Leandra acutiflora* (Naudin) Cogn. (n = 1)**

Gall: on stem, fusiform, green, glabrous, one-chambered (Fig. 13A). **Gall-inducer:** Lepidoptera. **Trail:** *Teresópolis:* Cachoeira Ceci-Peri (13.IX.2021).

First gall record on this plant species.

Several galls on other *Leandra* species and morphospecies are known from MG (Fernandes *et al.,* 2001; Maia & Fernandes, 2004; Carneiro *et al.,* 2009), Parque Nacional do Itatiaia (Maia & Mascarenhas, 2017), SP (Maia *et al.,* 2008) and RS (Mendonça-Jr. *et al.,* 2014).

***Meriania paniculata* (DC.) Triana (n = 1)**

Gall: on leaf, lenticular, intralaminar, green, glabrous, one-chambered (Fig. 13B). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* 360 (26.X.2021), Mozart-Catão (27.X.2021), Bosque Santa Helena (26.XI.2021).

***Meriania* sp. (n = 1)**

Gall: on leaf, lenticular, intralaminar, green, glabrous, one-chambered (Fig. 13C). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Cartão Postal (25.XI.2021), Mozart-Catão (27.X.2021).

First records of galls on this plant genus.

***Miconia buddlejoides* Triana (n = 4)**

Gall: on stem, fusiform, green, with short trichomes, one or multichambered (Fig. 13D). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021), Suspensa (26.XI.2021).
Gall: on leaf, conical, green, glabrous (Fig. 13E). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Cartão Postal (25.XI.2021).
Gall: on leaf, globoid, intralaminar, yellow or brown, glabrous, one-chambered (Fig. 13F). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* Barragem to Cachoeira do Papel entrance (14.IX.2021), Cartão Postal (15.IX.2021), Mozart-Catão (27.X.2021), Suspensa (26.XI.2021).
Gall: on leaf, globoid, green, glabrous (Fig. 13G). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Suspensa (26.XI.2021).

First records of gall on this plant species.

***Miconia fasciculata* Gardner (n = 3)**

Gall: on stem, fusiform, woody, brown, glabrous, multichambered (Fig. 13H). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* 360 (26.X.2021), Mozart Catão (25.V.2022).
Gall: on leaf, ovoid, yellow, glabrous, one-chambered (Fig. 13I). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* 360 (26.X.2021), Mozart Catão (25.V.2022).
Gall: on bud, globoid, yellow, glabrous, one-chambered (Fig. 13J). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* 360 (26.X.2021).

Maia *et al.* (2008) and Carneiro *et al.* (2009) reported different galls on this plant species in SP and MG, respectively.

***Miconia paniculata* (DC.) Naudin (n = 1)**

Gall: on stem, fusiform to globoid, brown, glabrous, multichambered (Fig. 13K). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Bosque Santa Helena (27.X.2021), Suspensa (25.X.2021).

First records of gall on this plant species.

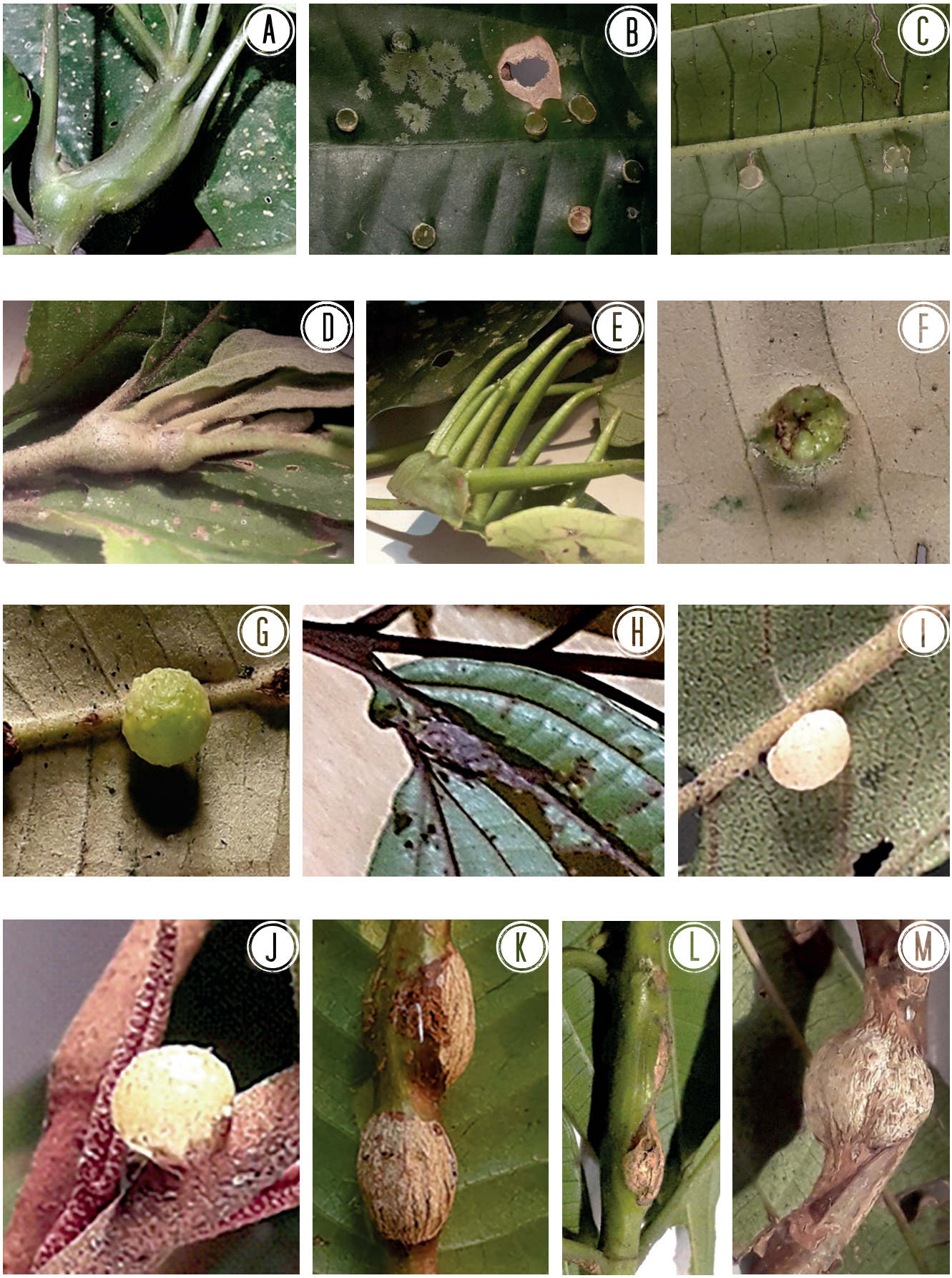

Figure 13. Insect galls of Parque Nacional da Serra dos Órgãos (RJ, Brazil): (A-M) On Melastomataceae: (A) On *Leandra acutiflora* (Naudin) Cogn., bud gall, (B) On *Meriania paniculata* (DC.) Triana, leaf gall, (C) On *Meriania* sp., leaf gall, (D-G) On *Miconia buddlejoides* Triana, (D) stem gall, (E) leaf gall, (F) leaf gall, (G) leaf gall, (H-J) On *Miconia fasciculata* Gardner: (H) stem gall, (I) leaf gall, (J) bud gall, (K) On *Miconia paniculata,* stem gall, (L) On *Miconia* sp. 1, stem gall, (M) On *Miconia* sp. 2, stem gall.

***Miconia* sp. 1 (n = 1)**

Gall: on stem, brown, woody, glabrous (Fig. 13L). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Poço do Castelo (06.XII.2021), Barragem to Casa do Pesquisador entrance (07.XII.2021).

***Miconia* sp. 2 (n = 1)**

Gall: on stem, globoid, brown, glabrous (Fig. 13M). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021).

***Miconia* sp. 3 (n = 1)**

Gall: on leaf midvein, fusiform, green, glabrous (Fig. 14A). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* 360 (26.X.2021), Suspensa (23.V.2022), Mozart Catão (25.V.2022).

***Miconia* sp. 4 (n = 2)**

Gall: on leaf, globoid, brown, glabrous, one-chambered (Fig. 14B). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Primavera (13.IX.2021), Cartão Postal (15.IX.2021), 360 (26.X.2021), Mozart-Catão (27.X.2021).
Gall: on bud, conical, wrinkled, green, glabrous, one-chambered (Fig. 14C). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Primavera (15.IX.2021), Cartão Postal (15.IX.2021), Mozart-Catão (27.X.2021).

***Miconia* sp. 5 (n = 1)**

Gall: on leaf, globoid, intralaminar, green, glabrous (Fig. 14D). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trail:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021).

***Miconia* sp. 6 (n = 1)**

Gall: on leaf, globoid, green or brown, glabrous, one-chambered (Fig. 14E). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* 360 (26.X.2021).

***Miconia* sp. 7 (n = 1)**

Gall: on leaf vein, globoid, intralaminar, green, glabrous, one-chambered (Fig. 14F). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Suspensa (26.XI.2021, 23.V.2022).

***Miconia* sp. 8 (n = 2)**

Gall: on bud, ovoid or globoid, red, wrinkled, glabrous (Fig. 14G). **Gall-inducer:** not determined. **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* Suspensa (25.XI.2021), Mozart-Catão (27.X.2021), Barragem to Casa do Pesquisador entrance (07.XII.2021).
Gall: on leaf, globoid, green or red, glabrous (Fig. 14H). **Gall-inducer:**Cecidomyiidae.**Parasitoids:**Hymenoptera. **Trail:** *Teresópolis:* Mozart-Catão (27.X.2021, 25.V.2022).

Several species and morphospecies of *Miconia* host galls as reported by Almada & Fernandes (2011), Maia (2011), Silva *et al.* (2011), Araújo *et al.* (2012), Julião *et al.* (2014) and Carvalho & Mota (2018) in AM; Santos *et al.* (2012) and Araújo *et al.* (2011, 2014) in GO, Vieira *et al.* (2018) in BA, Santos *et al.* (2011) in PE, Fernandes *et al.* (1997, 2001), Gonçalves-Alvim & Fernandes (2001), Maia & Fernandes (2004), Malves & Frieiro-Costa (2012), and Maia (2013a, 2014) in MG, Maia (2001), Rodrigues *et al.* (2014) and Carvalho-Fernandes *et al.* (2016) in RJ, Urso-Guimarães & Scareli-Santos (2006), Maia *et al.* (2008), Ribeiro *et al.* (2019), and Saito & Urso-Guimarães (2012) in SP, Toma & Mendonça-Jr. (2013) and Mendonça-Jr. *et al.* (2014) in RS.

***Pleroma* sp. 1 (n = 1)**

Gall: on bud, rosette, green, with short trichomes (Fig. 14I). **Gall-inducer:** Coleoptera. **Trail:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021).

***Pleroma* sp. 2 (n = 1)**

Gall: on leaf, petiole and stem, globoid, green, with trichomes, one-chambered (Fig. 14J). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021).

***Pleroma* sp. 3 (n = 1)**

Gall: on bud, globoid, green, with trichomes, multichambered (Fig. 14K). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Barragem road (from Casa do Pesquisador to Alojamento (30.III.2022).

***Pleroma* sp. 4 (n = 1)**

Gall: on bud and leaf, globoid, green, with hard trichomes (Fig. 14L). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021).

***Pleroma* sp. 5 (n = 1)**

Gall: on leaf vein, fusiform, green, glabrous (Fig. 15A). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Suspensa (26.XI.2021).

Maia & Fernandes (2004) and Maia (2022) reported galls on *Pleroma* D. Don in MG and SP, respectively.

Melastomataceae sp. 1 (n = 2)

Gall: on leaf vein, fusiform, green, glabrous, one-chambered (Fig. 15B). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Mozart-Catão (27.X.2021).
Gall: on petiole, fusiform, brown, glabrous, one-chambered (Fig. 15C). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Mozart-Catão (27.X.2021).

Melastomataceae sp. 2 (n = 2)

Gall: on leaf, globoid, green, with trichomes, one-chambered (Fig. 15D). **Gall-inducer:** Cecidomyiidae.

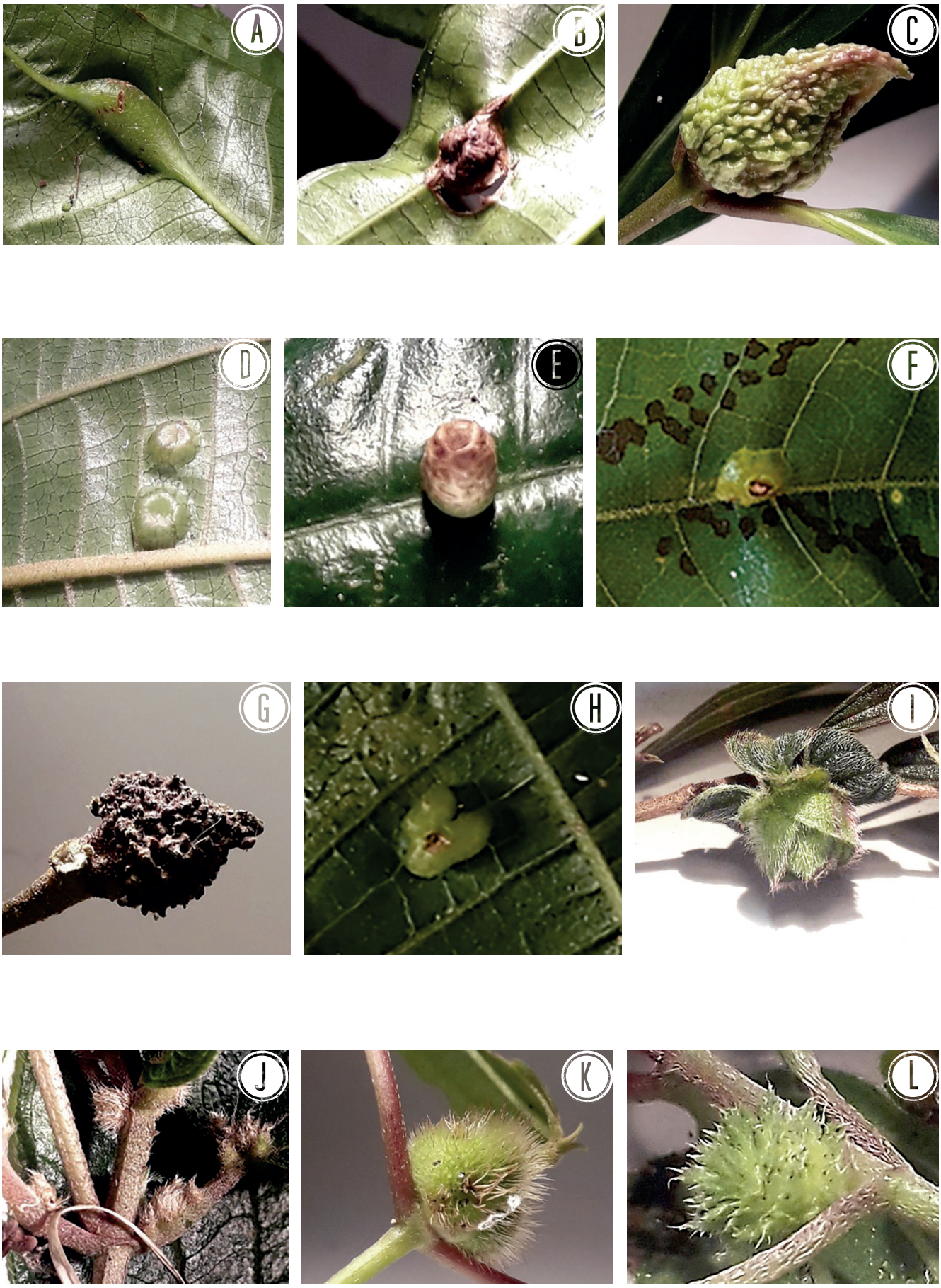

Figure 14. Insect galls of Parque Nacional da Serra dos Órgãos (RJ, Brazil): (A-L) On Melastomataceae: (A) On *Miconia* sp. 3, leaf gall, (B-C) On *Miconia* sp. 4: (B) leaf gall, (C) bug gall, (D) On *Miconia* sp. 5, leaf gall, (E) On *Miconia* sp. 6, leaf gall, (F) On *Miconia* sp. 7, leaf gall, (G-H) On *Miconia* sp. 8: (G) bud gall, (H) leaf gall, (I) On *Pleroma* sp. 1, bud gall, (J) On *Pleroma* sp. 2, leaf petiole gall, (K) On *Pleroma* sp. 3, bud gall, (L) On *Pleroma* sp. 4, bud gall.

Parasitoids: Hymenoptera. **Trails:** *Teresópolis:* Primavera (13.IX.2021), Barragem road (between Primavera entrances) (15.IX.2021); *Guapimirim:* Poço da Capela (28.III.2022), Caninana (29.III.2022), Poço da Preguiça (29.III.2022), Poço Verde (31.III.2022), Araçari Camping (25.IV.2022).
Gall: on leaf, fusiform, green, with short trichomes, one-chambered. **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Barragem road (between Primavera entrances) (15.IX.2021).

Melastomataceae sp. 3 (n = 1)

Gall: on leaf, globoid, yellow, with trichomes, one-chambered (Fig. 15E). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Mozart-Catão (27.X.2021, 25.V.2022).

Melastomataceae sp. 4 (n = 2)

Gall: on stem, fusiform, green, with short trichomes, one-chambered (Fig. 15F). **Gall-inducer:** not determined. **Trail:** *Guapimirim:* Circular (26.IV.2022).
Gall: on leaf, globoid, green, yellow or red, with trichomes, one-chambered (Fig. 15G). **Gall-inducer:** not determined. **Trail:** *Guapimirim:* Circular (26.IV.2022).

Melastomataceae sp. 5 (n = 1)

Gall: on stem, fusiform, green, glabrous, one-chambered (Fig. 15H). **Gall-inducer:** not determined. **Trail:** *Guapimirim:* Araçari Camping (25.IV.2022).

Melastomataceae sp. 6 (n = 1)

Gall: on leaf vein, fusiform, green, glabrous, one-chambered (Fig. 15I). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021), 360 (26.X.2021).

Melastomataceae sp. 7 (n = 1)

Gall: on stem, fusiform, brown, glabrous, one-chambered (Fig. 15J). **Gall-inducer:** not determined. **Succcessor:** Coccoidea (Hemiptera). **Trail:** *Teresópolis:* 360 (26.X.2021), Barragem road (from Casa do Pesquisador to Alojamento (30.III.2022).

Melastomataceae sp. 8 (n = 1)

Gall: on bud, globoid, red, with trichomes (Fig. 15K). **Gall-inducer:** Lepidoptera. **Trail:** *Teresópolis:* Primavera (15.IX.2021).

Meliaceae (n = 5)

***Guarea guidonia* (L.) Sleumer (n = 1)**

Gall: on leaf, globoid, extralaminar, yellow, glabrous. **Gall-inducer:** Cecidomyiidae. **Trail:** *Guapimirim:* Poço da Capela (28.III.2022).

Fernandes *et al.* (2001) and Rodrigues *et al.* (2014) reported this gall in MG (Vale do Rio Doce) and RJ (Mangaratiba), respectively. Urso-Guimarães *et al.* (2017) and Ribeiro *et al.* (2019) recorded other gall morphotypes on the same host species.

***Guarea macrophylla* subsp. *tuberculata* (Vell.) T.D. Penn. (n = 2)**

Gall: on leaf midvein, fusiform, green, glabrous (Fig. 15L). **Gall-inducer:** *Neolasioptera* sp. (Cecidomyiidae). **Trails:** *Teresópolis:* Suspensa (25.X.2021), Bosque Santa Helena (06.XII.2021); *Guapimirim:* Circular (27.IV.2022).
Gall: on leaf, globoid, yellow, glabrous, one-chambered (Fig. 16A). **Gall-inducer:** *Sphaeromyia flava* Maia, 2007 (Cecidomyiidae). **Parasitoids:** Hymenoptera. **Predators:** spider. **Trails:** *Teresópolis:* Suspensa (25.X.2021); *Guapimirim:* Circular (27.IV.2022).

Maia *et al.* (2008) and Arriola & Melo-Júnior (2016) reported these galls on Bertioga (SP) and Babitonga (SC), respectively.

***Trichilia silvatica* C. DC. (n = 2)**

Gall: on leaf, cylindrical, brown (dried), glabrous, one-chambered (Fig. 16B). **Gall-inducer:** not determined. **Trails:** *Guapimirim:* Poço da Capela (28.III.2022), Caninana (29.III.2022), Mãe d'Água (24.V.2022).
Gall: on apical bud, globoid, brown, glabrous, one-chambered (Fig. 16C). **Gall-inducer:** Cecidomyiidae. **Trail:** *Guapimirim:* Circular (26.IV.2022).

Galls on other congeneric species and morphospecies are known from AM (Araújo *et al.,* 2012), PE (Santos *et al.,* 2011; Araújo *et al.,* 2012), MS (Ascendino & Maia, 2018), RJ (Maia & Carvalho-Fernandes, 2016; Maia & Siqueira, 2020), SP (Maia *et al.,* 2008) and RS (Mendonça-Jr. *et al.,* 2014).

Monimiaceae (n = 3)

***Mollinedia glabra* (Spreng.) Perkins (n = 2)**

Gall: on bud, fusiform to globoid, woody, brown, glabrous, one-chambered (Fig. 16D). **Gall-inducer:** not determined. **Trails:** *Guapimirim:* Circular (26.IV.2022), Museu Von Martius (27.IV.2022).
Gall: on stem, fusiform, woody, brown, glabrous, one-chambered (Fig. 16E). **Gall-inducer:** Cecidomyiidae. **Cecidophagous:** Lepidoptera. **Trails:** *Guapimirim:* Circular (26.IV.2022), Museu Von Martius (27.IV.2022).

First records of gall on this plant species.

***Mollinedia schottiana* (Spreng.) Perkins (n = 1)**

Gall: on leaf, marginal roll, green, glabrous (Fig. 16F). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Suspensa (26.XI.2021).

Goetz *et al.* (2018) reported a bud gall on this plant and Mendonça-Jr. *et al.* (2014) three different stem

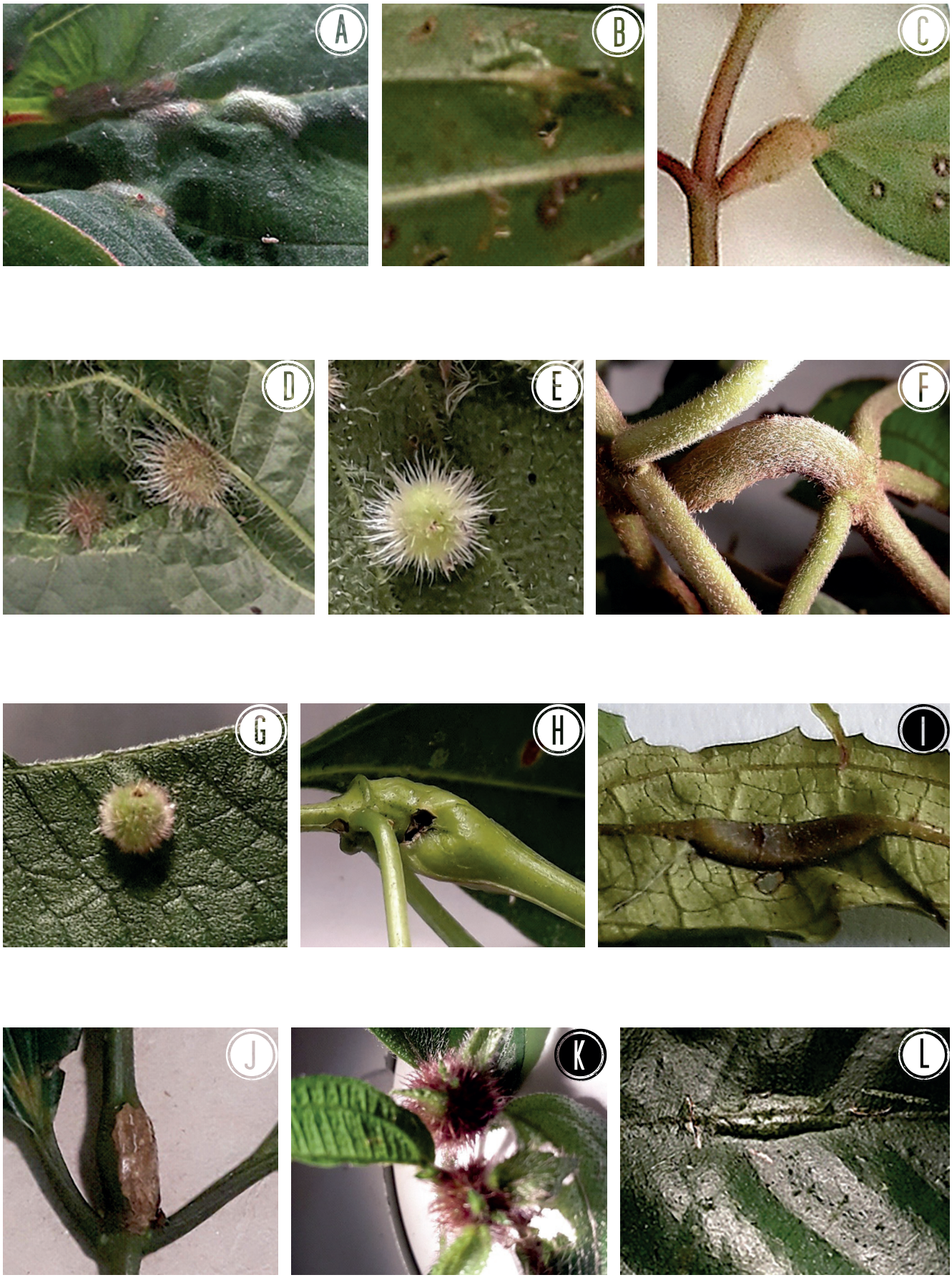

Figure 15. Insect galls of Parque Nacional da Serra dos Órgãos (RJ, Brazil): (A-K) On Melastomataceae: (A) On *Pleroma* sp. 5, leaf gall, (B-C) On Melastomataceae sp. 1: (B) leaf gall, (C) petiole gall, (D) On Melastomataceae sp. 2, leaf gall, (E) On Melastomataceae sp. 3, leaf gall, (F-G) On Melastomataceae sp. 4: (F) stem gall, (G) leaf gall, (H) On Melastomataceae sp. 5, stem gall, (I) On Melastomataceae sp. 6, leaf gall, (J) On Melastomataceae sp. 7, stem gall, (K) On Melastomataceae sp. 8, bud gall, (L) On *Guarea macrophylla* subsp. *tuberculata* (Vell.) T.D. Penn. (Meliaceae), leaf gall.

galls, all in RS. Other congeneric species host galls in PE (Santos *et al.,* 2011), Parque Nacional do Itatiaia (Maia & Mascarenhas, 2017), PR (Santos & Ribeiro, 2015), and RS (Goetz *et al.,* 2018).

Moraceae (n = 1)

***Sorocea guilleminiana* Gaudich (n = 1)**

Gall: on bud, rosette, green, imbricated, glabrous, one-chambered (Fig. 16G). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* Mozart Catão (27.X.2021, 25.V.2022), Suspensa (26.XI.2021, 23.V.2022), Poço Dois Irmãos (26.XI.2021), Barragem to Casa do Pesquisador entrance (07.XII.2021), Poço do Beija-Flor (07.XII.2021), Centro de Operações to Camping (28.III.2022).

Araújo *et al.* (2012) reported a leaf gall on this plant species in AM. Other species and morphospecies of *Sorocea* A. St.-Hill. host galls in AM (Julião *et al.,* 2014), PE (Fernandes *et al.,* 2009), and RS (Goetz *et al.,* 2018).

Myrsinaceae (n = 1)

***Myrsine* sp. (n = 1)**

Gall: on leaf midvein, fusiform, green, glabrous, one-chambered (Fig. 16H). **Gall-inducer:** Lepidoptera. **Trail:** *Teresópolis:* 360 (26.X.2021).

Several congeneric species host galls as reported by Maia & Fernandes (2004) in MG, Maia (2001) in RJ, Maia *et al.* (2008) in SP, Goetz *et al.* (2018) and Mendonça-Jr. *et al.* (2014) in RS.

Myrtaceae (n = 40)

***Campomanesia guaviroba* (DC.) Kiaersk. (n = 2)**

Gall: on leaf, globoid, intralaminar, yellow, glabrous, one-chambered (Fig. 16I). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trail:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021).
Gall: on leaf vein, fusiform, green, glabrous, two-chambered (Fig. 16J). **Gall-inducer:** *Clinodiplosis* sp. (Cecidomyiidae). **Trail:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021).

Maia *et al.* (2008) reported the same leaf vein gall in Bertioga (SP). Galls on other congeneric species and morphospecies are known from GO (Araújo *et al.,* 2014), MS (Urso-Guimarães *et al.,* 2017), BA (Vieira *et al.,* 2018), MG (Maia & Fernandes, 2004) and RS (Mendonça-Jr. *et al.,* 2014).

***Eugenia laruotteana* Cambess. (n = 2)**

Gall: on leaf, conical, green, with trichomes (Fig. 16K). **Gall-inducer:** not determined. **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* 360 (26.X.2021), Suspensa (26.XI.2021), Poço do Beija-Flor (07.XII.2021), Cartão Postal (24.V.2022).
Gall: on leaf, globoid, extralaminar, red, glabrous, one-chambered (Fig. 16L). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Suspensa (26.XI.2021).

First records of gall on this plant species.

***Eugenia prasina* O. Berg. (n = 2)**

Gall: on leaf, conical, yellow, glabrous, one-chambered (Fig. 16M). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trail:** *Guapimirim:* Poço Verde (31.III.2022).
Gall: on leaf vein, fusiform, green, glabrous (Fig. 16N). **Gall-inducer:** not determined. **Trail:** *Guapimirim:* Poço Verde (31.III.2022).

First records of gall on this plant species.

***Eugenia uniflora* L. (n = 1)**

Gall: on leaf, lenticular, black, glabrous, one-chambered. **Gall-inducer:** *Neolasioptera eugeniae* Maia, 1992 (Cecidomyiidae). **Trail:** *Teresópolis:* Mozart-Catão (27.X.2021).

This same gall morphotype was reported in ES and RJ (Maia, 2021).

***Eugenia* sp. 1 (n = 1)**

Gall: on leaf, cylindrical, green, glabrous. **Gall-inducer:** Cecidomyiidae (Fig. 16O). **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* Mozart-Catão (27.X.2021), Cartão Postal (24.V.2022).

***Eugenia* sp. 2 (n = 4)**

Gall: on young leaf, globoid, intralaminar, red, glabrous, one-chambered (Fig. 17A). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Mozart Catão to Primavera (25.X.2021), 360 (26.X.2021).
Gall: on apical bud, imbricated, green, glabrous, one-chambered (Fig. 17B). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* 360 (26.X.2021).
Gall: on leaf midvein, globoid, green, glabrous, one-chambered (Fig. 17C). **Gall-inducer:** not determined. **Parasitoids:** Hymenoptera. **Trail:** *Guapimirim:* Circular (26.IV.2022).
Gall: on apical bud, globoid, woody, brown, glabrous, one-chambered (Fig. 17D). **Gall-inducer:** not determined. **Trail:** *Guapimirim:* Circular (26.IV.2022).

***Eugenia* sp. 3 (n = 3)**

Gall: on leaf vein, fusiform, brown (dried), glabrous, one-chambered (Fig. 17E). **Gall-inducer:** not determined. **Trail:** *Guapimirim:* Caninana (24.V.2022).
Gall: on stem, fusiform, brown, glabrous, one-chambered (Fig. 17F). **Gall-inducer:** not determined. **Trail:** *Guapimirim:* Caninana (24.V.2022).

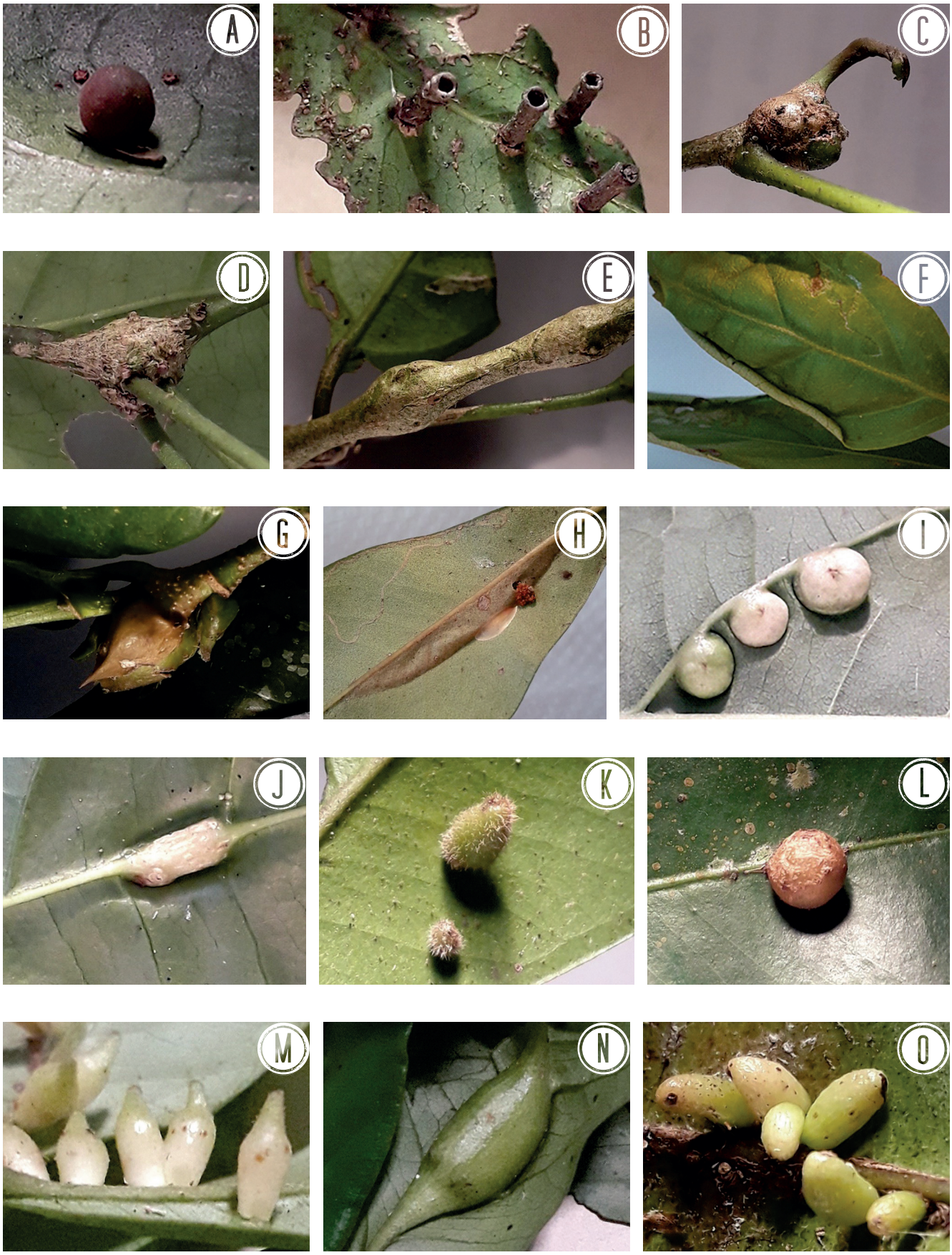

Figure 16. Insect galls of Parque Nacional da Serra dos Órgãos (RJ, Brazil): (A-C) On Meliaceae: (A) On *Guarea macrophylla* subsp. *tuberculata* (Vell.) T.D. Penn., leaf gall, (B-C) On *Trichilia silvatica* C. DC.: (B) leaf gall, (C) bud gall, (D-F) On Monimiaceae: (D-E) On *Mollinedia glabra* (Spreng.) Perkins: (D) bud gall, (E) stem gall, (F) On *Mollinedia schottiana* (Spreng.) Perkins, leaf gall, (G) On *Sorocea guillemiana* Gaudich (Moraceae), bud gall, (H) On *Myrsine* sp. (Myrsinaceae), leaf gall, (I-O) On Myrtaceae: (I-J) On *Campomanesia guaviroba* (DC.) Kiaersk.: (I) globoid leaf gall, (J) fusiform leaf vein gall, (K-L) On *Eugenia laruotteana* Cambess.: (K) conical leaf gall, (L) globoid leaf gall, (M-N) On *Eugenia prasina* O. Berg.: (M) conical leaf gall, (N) fusiform leaf vein gall, (O) On *Eugenia* sp. 1, leaf gall.

Gall: on bud, globoid, brown (dried), glabrous, multi-chambered (Fig. 17G). **Gall-inducer:** not determined. **Trail:** *Guapimirim:* Caninana (24.V.2022).

***Eugenia* sp. 4 (n = 2)**

Gall: on stem, fusiform, brown, glabrous, one-chambered (Fig. 17H). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trail:** *Teresópolis:* Suspensa (26.XI.2021).
Gall: on leaf, globoid, intralaminar, yellow, glabrous, one-chambered (Fig. 17I). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Suspensa (26.XI.2021).

Several species and morphospecies of *Eugenia* host galls as reported by Julião *et al.* (2014) in AM, Araújo *et al.* (2011, 2014) in GO, Urso-Guimarães *et al.* (2017) and Ascendino & Maia (2018) in MS, Nogueira *et al.* (2016), Vieira *et al.* (2018), Silva *et al.* (2018) and Santana *et al.* (2020) in BA, Fernandes *et al.* (1988, 1997, 2001), Gonçalves-Alvim & Fernandes (2001), Maia & Fernandes (2004), Carneiro *et al.* (2009), Coelho *et al.* (2009, 2013), Luz *et al.* (2012), Malves & Frieiro-Costa (2012), and Maia (2013a) in MG, Maia (2001), Rodrigues *et al.* (2014) and Carvalho-Fernandes *et al.* (2016) in RJ, Urso-Guimarães & Scareli-Santos (2006), Maia *et al.* (2008), Ribeiro *et al.* (2019), Saito & Urso-Guimarães (2012) in SP, and Mendonça-Jr. *et al.* (2014) in RS.

***Myrcia* sp. 1 (n = 2)**

Gall: on leaf, globoid, intralaminar, green or yellow, glabrous, one-chambered (Fig. 17J). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* 360 (26.X.2021), Poço Dois Irmãos (26.XI.2021), Suspensa (26.XI.2021), Mozart-Catão (25.V.2022); *Guapimirim:* Mãe d'Água (24.V.2022).
Gall: on leaf, globoid, yellow, extralaminar, with trichomes (Fig. 17K). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Suspensa (26.XI.2021).

***Myrcia* sp. 2 (n = 1)**

Gall: on bud, globoid, green, glabrous (Fig. 17L). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* 360 (26.X.2021).

***Myrcia* sp. 3 (n = 1)**

Gall: on leaf, globoid, intralaminar, green, glabrous (Fig. 18A). **Gall-inducer:** Cecidomyiidae. **Trail:** *Guapimirim:* Circular (26.IV.2022).

***Myrcia* sp. 4 (n = 1)**

Gall: on leaf midvein, globoid, green, glabrous, one-chambered (Fig. 18B). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Mozart-Catão to Primavera (27.X.2021).

Galls on congeneric species and morphospecies are known from AM (Araújo *et al.,* 2012; Julião *et al.,* 2014; Carvalho & Mota, 2018), GO (Araújo *et al.,* 2007, 2011, 2014), MS (Urso-Guimarães *et al.,* 2017; Ascendino & Maia, 2018), BA (Lima & Calado, 2018; Silva *et al.,* 2018; Santana *et al.,* 2020), MG (Fernandes *et al.,* 1997; Fernandes *et al.,* 2001; Gonçalves-Alvim & Fernandes, 2001; Maia & Fernandes, 2004; Carneiro *et al.,* 2009; Coelho *et al.,* 2009; Malves & Frieiro-Costa, 2012), RJ (Maia, 2001), SP (Urso-Guimarães & Scareli-Santos, 2006; Maia *et al.,* 2008; Ribeiro *et al.,* 2019; Saito & Urso-Guimarães, 2012), SC (Melo-Júnior *et al.,* 2018), and RS (Mendonça-Jr. *et al.,* 2014).

***Myrciaria disticha* O. Berg. (n = 2)**

Gall: on stem, fusiform, brown, glabrous, one-chambered (Fig. 18C). **Gall-inducer:** not determined. **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* Suspensa (25.XI.2021), Bosque Santa Helena (26.XI.2021).
Gall: on leaf, conical, green, glabrous, one-chambered (Fig. 18D). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Suspensa (25.XI.2021).

Galls on other congeneric species and morphospecies are known from AM (Almada & Fernandes, 2011), BA (Vieira *et al.,* 2018), MG (Fernandes *et al.,* 2001; Maia, 2013a; Maia & Fernandes, 2004), RJ (Maia, 2001, 2013b; Maia & Carvalho-Fernandes, 2016), SP (Maia *et al.,* 2008), and RS (Mendonça-Jr. *et al.,* 2014).

***Plinia martinelli* G.M. Barroso & M.V. Peron (n = 1)**

Gall: on leaf, marginal roll, green, glabrous (Fig. 18E). **Gall-inducer:** Cecidomyiidae. **Cecidophagous:** Lepidoptera. **Trail:** *Teresópolis:* Primavera (13.IX.2021).

First gall record on this plant species.

Silva *et al.* (2018) reported a bud gall on *Plinia peruviana* (Poir) in BA.

***Siphoneugena* sp. 1 (n = 3)**

Gall: on leaf, cylindrical, green, with short trichomes, one-chambered (Fig. 18F). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Mozart-Catão (27.X.2021).
Gall: on stem, fusiform, brown, glabrous, one-chambered (Fig. 18G). Gall-inducer not determined. **Trail:** *Teresópolis:* Mozart-Catão (27.X.2021).
Gall: on leaf, globoid, yellow or red, glabrous, one-chambered (Fig. 18H). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Suspensa (26.XI.2021), Poço Dois Irmãos (26.XI.2021).

***Siphoneugena* sp. 2 (n = 1)**

Gall: on bud, conical, green, glabrous (Fig. 18I). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Mozart-Catão (27.X.2021).

Toma & Mendonça-Jr. (2013) reported galls on *Siphoneugena reitzii* D. Legrand in RS.

Myrtaceae sp. 1 (n = 2)

Gall: on leaf, marginal roll, green, glabrous. **Gall-inducer:** Thysanoptera (Fig. 18J). **Trails:** *Teresópolis:* Mozart-Catão to Primavera (25.X.2021), Mozart-Catão (27.X.2021),

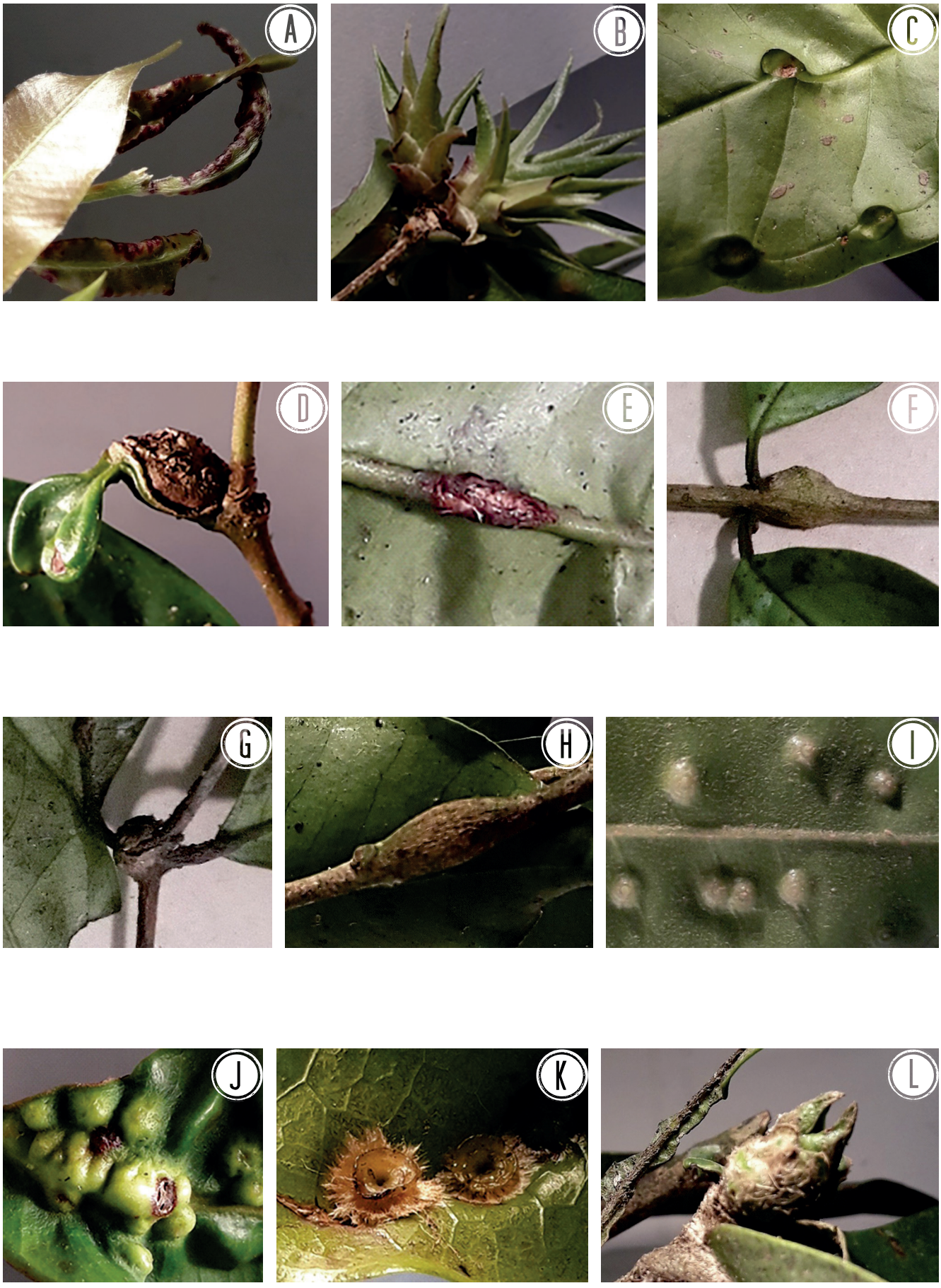

Figure 17. Insect galls of Parque Nacional da Serra dos Órgãos (RJ, Brazil): (A-L) On Myrtaceae: (A-D) On *Eugenia* sp. 2: (A) leaf gall, (B) bud gall, (C) leaf gall, (D) bud gall, (E-G) On *Eugenia* sp. 3: (E) leaf vein gall, (F) stem gall, (G) bud gall, (H-I) On *Eugenia* sp. 4: (H) stem gall, (I) leaf gall, (J-K) On *Myrcia* sp. 1: (J) intralaminar leaf gall, (K) extralaminar leaf gall, (L) On *Myrcia* sp. 2, bud gall.

Suspensa (25.XI.2021); *Guapimirim:* Araçari Camping (25. IV.2022).
Gall: on leaf, globoid, intralaminar, green, glabrous, one-chambered. **Gall-inducer:** not determined. **Trail:** *Guapimirim:* Araçari Camping (25.IV.2022).

Myrtaceae sp. 2 (n = 1)

Gall: on stem, fusiform, brown, glabrous (Fig. 18K). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Barragem to Casa do Pesquisador entrance (07.XII.2021).

Myrtaceae sp. 3 (n = 1)

Gall: on leaf, globoid, green or red, glabrous, one-chambered (Fig. 18L). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Cartão Postal (15.IX.2021), Cartão Postal (24.V.2022).

Myrtaceae sp. 4 (n = 1)

Gall: on leaf, conical, green, glabrous, one-chambered (Fig. 19A). **Gall-inducer:** not determined. **Parasitoids:** Hymenoptera. **Trail:** *Teresópolis:* Suspensa (26.XI.2021).

Myrtaceae sp. 5 (n = 2)

Gall: on apical bud, fusiform, brown, woody, glabrous, multichambered. **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Suspensa (26.XI.2021).
Gall: on bud, ovoid, brown, glabrous, multichambered (Fig. 19B). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Primavera (13.IX.2021), Suspensa (26.XI.2021).

Myrtaceae sp. 6 (n = 1)

Gall: on leaf, globoid intralaminar, brown (dried), glabrous (Fig. 19C). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Catão-Primavera (25.X.2021), *Guapimirim:* Araçari Camping (25.IV.2022).

Myrtaceae sp. 7 (n = 1)

Gall: on leaf, globoid, intralaminar, yellow, glabrous, one-chambered (Fig. 19D). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* 360 (26.X.2021), Suspensa (26. XI.2021); *Guapimirim:* Poço Verde (31.III.2022).

Myrtaceae sp. 8 (n = 1)

Gall: on leaf, claviform, green, glabrous, one-chambered (Fig. 19E). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* 360 (26.X.2021), Mozart-Catão (27.X.2021), Suspensa (25.XI.2021).

Myrtaceae sp. 9 (n = 1)

Gall: on leaf, conical, yellow, glabrous, one-chambered (Fig. 19F). **Gall-inducer:** Cecidomyiidae. **Trail:** *Guapimirim:* Circular (26.IV.2022).

Nyctaginaceae (n = 11)

***Guapira opposita* (Vell.) Reitz. (n = 11)**

Gall: on stem, fusiform, green, glabrous (Fig. 19G). **Gall-inducer:** *Proasphondylia guapirae* Maia, 1993 (Cecidomyiidae). **Parasitoids:** Hymenoptera. **Trail:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021), Camping to Alojamento (25.IV.2022), Cartão Postal (24.V.2022), Mozart-Catão (25.V.2022).
Gall: on stem, globoid, brown, glabrous, multichambered (Fig. 19H). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021), Suspensa (25.XI.2021), Barragem road (between Camping and Alojamento) (25.IV.2022).
Gall: on leaf, globoid, green or yellow, with trichomes, one-chambered (Fig. 19I). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Cachoeira de Papel (14.IX.2021).
Gall: on leaf, globoid, red, with trichomes, one-chambered (Fig. 19J). **Gall-inducer:** *Bruggmannia robusta* Maia & Couri, 1993 (Cecidomyiidae). **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* Barragem to Casa do Pesquisador (14.IX.2021), Barragem to Cachoeira de Papel (14.IX.2021), Mozart-Catão to Primavera (25.X.2021), 360 (26.X.2021), Suspensa (25.XI.2021), Poço do Beija-Flor (07.XII.2021); *Guapimirim:* Recanto das Ruínas (28.III.2022), Ponte Velha (29.III.2022), Caninana (29.III.2022), Poço Verde (31.III.2022), Museu Von Martius (27.IV.2022).
Gall: on leaf, globoid, yellow, glabrous, one-chambered (Fig. 19K). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* Barragem to Cachoeira de Papel (14.IX.2021), Barragem to Casa do Pesquisador (14.IX.2021), Suspensa (26.XI.2021), Poço do Beija-Flor (07.XII.2021).
Gall: on bud and leaf, globoid, green, glabrous, one-chambered (Fig. 19L). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021), 360 (26.X.2021), Suspensa (26.XI.2021), Barragem road (from Casa do Pesquisador to Alojamento) (30.III.2022), Cartão Postal (24.V.2022); *Guapimirim:* Poço da Capela (28.III.2022), Ponte Velha (29.III.2022), Poço Verde (31. III.2022), Araçari Camping (25.IV.2022), Circular (26. IV.2022), Mãe d'Água (24.V.2022), Alameda Von Spix (25.V. 2022).
Gall: on bud, globoid, green or red, glabrous (Fig. 19M). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Cartão Postal (15.IX.2021, 24.V.2022), 360 (26.X.2021), Mozart-Catão (27.X.2021), Suspensa (25.XI.2021).
Gall: on leaf, conical, intralaminar, green or red, glabrous (Fig. 20A). **Gall-inducer:** *Bruggmannia acaudata* Maia, 2004 (Cecidomyiidae). **Trails:** *Teresópolis:* Barragem to Cachoeira de papel entrance (14.IX.2021), Cartão Postal (15.IX.2021, 24.V.2022), 360 (26.X.2021), Suspensa (25. XI.2021), Barragem to Casa do Pesquisador entrance (07.XII.2021), Barragem road (between Camping and Alojamento) (25.IV.2022), Cartão Postal (24.V.2022).
Gall: on leaf, green, globoid, intralaminar, glabrous, one-chambered (Fig. 20B). **Gall-inducer:** Cecidomyiidae.

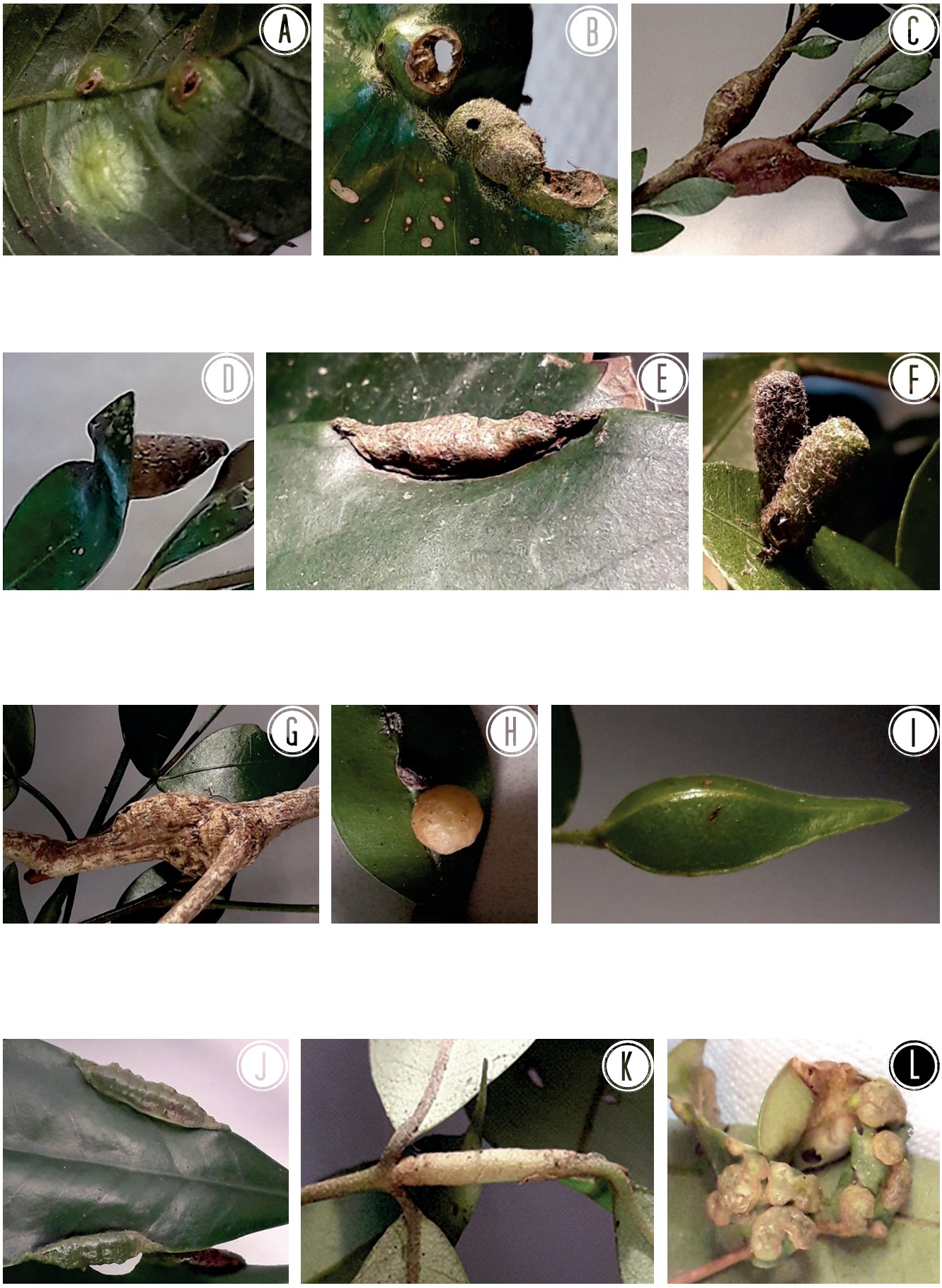

Figure 18. Insect galls of Parque Nacional da Serra dos Órgãos (RJ, Brazil): On Myrtaceae: (A-I) On *Myrcia* sp. 3, leaf gall, (B) *Myrcia* sp. 4, leaf gall, (C-D) On *Myrciaria disticha* O. Berg.: (C) stem gall, (D) leaf gall, (E) On *Plinia martinelli* G.M. Barroso & M.V. Peron, leaf gall, (F-H) On *Siphoeugena* sp. 1: (F) cylindrical leaf gall, (G) stem gall, (H) globoid leaf gall, (I) On *Siphoeugena* sp. 2, bud gall, (J) On Myrtaceae sp. 1, leaf gall, (K) On Myrtaceae sp. 2, stem gall, (L) On Myrtaceae sp. 3, leaf gall.

Parasitoids: Hymenoptera. **Trails:** *Teresópolis:* Casa do Pesquisador (13.IX.2021), Mozart-Catão to Primavera (25.X.2021), 360 (26.X.2021), Mozart-Catão (27.X.2021), Suspensa (25.XI.2021), Barragem to Casa do Pesquisador entrance (07.XII.2021), Cartão Postal (24.V.2022); *Guapimirim:* Recanto das Ruínas (28.III.2022), Poço da Capela (28.III.20220), Ponte Velha (29.III.2022), Poço Verde (31.III.2022), Circular (26.IV.2022), Caninana (24.V.2022), Mãe d'Água (24.V.2022), Araçari Camping (25.IV.2022), Alameda Von Spix (25.V.2022).
Gall: on leaf, lenticular, green, glabrous, one-chambered (Fig. 20C). **Gall-inducer:** *Bruggmannia elongata* Maia & Couri, 1993 (Cecidomyiidae). **Trails:** *Teresópolis:* 360 (26.X.2021), Suspensa (26.XI.2021), Barragem to Casa do Pesquisador entrance (07.XII.2021), Poço do Beija-Flor (07.XII.2021), Cartão Postal (24.V.2022); *Guapimirim:* Circular (26.IV.2022).
Gall: on fruit, globoid, green, glabrous (Fig. 20D). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trail:** *Teresópolis:* Suspensa (26.XI.2021).

First record of this gall morphotype on *G. opposita.*

Galls on this plant species have been reported in several states of Brazil: BA (Maia, 2014; Vieira *et al.,* 2018), ES (Maia *et al.,* 2014; Maia, 2020), RJ (Maia, 2001, 2013b; Rodrigues *et al.,* 2014; Maia & Carvalho-Fernandes, 2016; Carvalho-Fernandes *et al.,* 2016), SP (Maia *et al.,* 2008), SC (Melo-Júnior *et al.,* 2018), and RS (Mendonça-Jr. *et al.,* 2014; Goetz *et al.,* 2018).

Onagraceae (n = 1)

Fuchsia regia (Vell.) Munz. (n = 1)

Gall: on stem, fusiform, brown, glabrous (Fig. 20E). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021).

First record of gall on this plant genus.

Picramniaceae (n = 1)

Picramnia glazioviana Engl. (n = 1)

Gall: on bud, globoid, brown, glabrous (Fig. 20F). **Gall-inducer:** not determined. **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021), Suspensa (25.XI.2021).

First record of gall on this plant species.

Julião *et al.* (2014), Maia *et al.* (2008) and Maia (2013a) reported galls on other congeneric species in AM, SP and MG, respectively.

Piperaceae (n = 13)

Piper anisum (Spreng.) Angely (n = 3)

Gall: on bud, globoid, green or brown, glabrous, one-chambered (Fig. 20G). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* 360 (26.X.2021), Suspensa (26.XI.2021).
Gall: on leaf, lenticular, green, glabrous, one-chambered (Fig. 20H). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Suspensa (26.XI.2021).
Gall: on leaf, marginal roll, green, glabrous (Fig. 20I). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Suspensa (26.XI.2021), *Guapimirim:* Araçari Camping (25.IV.2022), Circular (26.IV.2022).

First record of gall on this plant species.

Piper arboreum Aubl. (n = 1)

Gall: on leaf, globoid, intralaminar, green, glabrous (Fig. 20J). **Gall-inducer:** Cecidomyiidae. **Trail:** *Guapimirim:* Araçari Camping (25.IV.2022).

This gall is known from GO (Araújo *et al.,* 2007, 2011, 2015), ES (Maia *et al.,* 2014), Parque Nacional do Itatiaia (Maia & Mascarenhas, 2017), and SP (Maia *et al.,* 2008).

Piper cernuum Vell. (n = 1)

Gall: on leaf and petiole, globoid, green, glabrous, one-chambered (Fig. 20K). **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021), 360 (26.X.2021), Suspensa (26.XI.2021, 23.V.2022).

First record of gall on this plant species.

Piper pseudopothifolium C. DC. (n = 1)

Gall: on bud and leaf, globoid, green, glabrous (Fig. 20L). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Mozart-Catão to Primavera (25.X.2021), Mozart-Catão (27.X.2021).

The gall was previously reported in MG by Maia (2013a).

Piper rioense Yunck. (n = 5)

Gall: on bud, green, glabrous, with several concavities (Fig. 21A). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Primavera (13.IX.2021), Mozart-Catão (27.X.2021), Barragem road (between Primavera entrances) (13.XI.2021), Suspensa (25.XI.2021), Barragem road (from Casa do Pesquisador to Alojamento (30.III.2022).
Gall: on bud, fusiform, green, glabrous, two-chambered (Fig. 21B). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021), Mozart-Catão (27.X.2021), Barragem road (from Casa do Pesquisador to Alojamento (30.III.2022).
Gall: on leaf, globoid, green, glabrous, one-chambered (Fig. 21C). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Mozart-Catão (27.X.2021), Suspensa (25.XI.2021), Barragem road (from Casa do Pesquisador to Alojamento (30.III.2022); *Guapimirim:* Ponte Velha (29.III.2022), Museu Von Martius (27.IV.2022), Araçari Camping (25.IV.2022), Alameda Von Spix (25.V. 2022).
Gall: on leaf petiole and vein, fusiform, green, with white trichomes (Fig. 21D). **Gall-inducer:** Coleoptera.

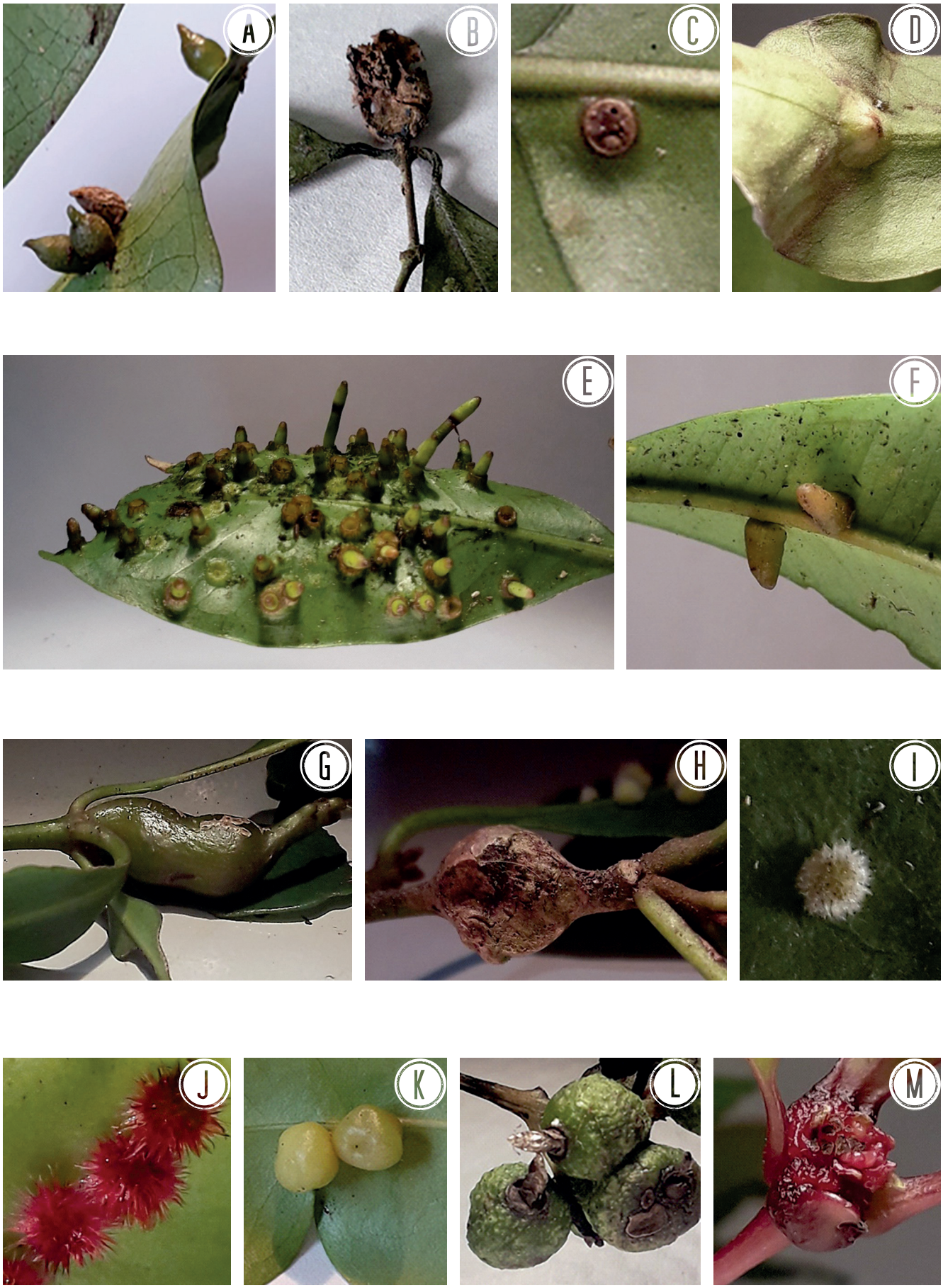

Figure 19. Insect galls of Parque Nacional da Serra dos Órgãos (RJ, Brazil): (A-E) On Myrtaceae: (A) On Myrtaceae sp. 4, bud gall, (B) On Myrtaceae sp. 5, leaf gall, (C) On Myrtaceae sp. 6, leaf gall, (D) On Myrtaceae sp. 7, leaf gall, (E) On Myrtaceae sp. 8, leaf gall, (F) On Myrtaceae sp. 9, leaf gall, (G-M) On *Guapira opposita* (Vell.) Reitz. (Nyctaginaceae), (G) stem gall, (H) stem gall, (I) leaf gall, (J) leaf gall, (K) leaf gall, (L) bud gall, (M) bud gall.

Trails: *Teresópolis:* Barragem road (between Primavera entrances) (15.IX.2021), Mozart-Catão (27.X.2021, 25.V.2022), Suspensa (25.XI.2021), Barragem to Casa do Pesquisador entrance (07.XII.2021), Centro de Operações to Camping (28.III.2022), Barragem road (from Casa do Pesquisador to Alojamento (30.III.2022), Cartão Postal (24.V.2022).
Gall: on leaf, globoid, extralaminar, green, with white trichomes (Fig. 21E). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021).

First records of galls on this plant species.

***Piper sprengelianum* C. DC. (n = 1)**

Gall: on leaf petiole, fusiform, green, glabrous, multichambered (Fig. 21F). **Gall-inducer:** Coleoptera. **Trail:** *Teresópolis:* Cartão Postal (15.IX.2021).

First record of gall on this plant species.

***Piper* sp. (n = 1)**

Gall: on bud, globoid, brown, glabrous, generally gregarious. **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Cartão Postal (15.IX.2021), Mozart-Catão to Primavera (25.X.2021), Mozart-Catão (27.X.2021), Poço Dois Irmãos (26.XI.2021), Poço do Beija-Flor (07.XII.2021), Barragem road (from Casa do Pesquisador to Alojamento (30.III.2022), Suspensa (23.V.2022), Cartão Postal (24.V.2022).

Polypodiaceae (n = 1)

***Niphidium crassifolium* (L.) Lellinger (n = 1)**

Gall: on leaf, concave, green, glabrous, one-chambered (Fig. 21G). Gall-inducer Cecidomyiidae. **Trails:** Teresópolis Barragem to Cachoeira de Papel entrance (14.IX.2021), Suspensa (26.XI.2021), Centro de Operações to Camping (28.III.2022).

This gall was previously reported in the Parque Nacional do Itatiaia (Maia & Mascarenhas, 2017).

Primulaceae (n = 3)

***Cybianthus* sp. (n = 3)**

Gall: on leaf midvein, fusiform, green, one-chambered, glabrous (Fig. 21H). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* 360 (26.X.2021).
Gall: on stem and leaf petiole, globoid, green, glabrous. **Gall-inducer:** not determined. **Trail:** *Teresópolis:* 360 (26.X.2021).
Gall: on leaf, globoid, reddish, intralaminar, glabrous. **Gall-inducer:** not determined. **Trail:** *Teresópolis:* 360 (26.X.2021).

Other galls are known from this plant genus in the Parque Nacional do Itatiaia (Maia & Mascarenhas, 2017).

Rubiaceae (n = 29)

***Bathysa mendoncaei* K. Schum (n = 1)**

Gall: on leaf vein, globoid, green, glabrous (Fig. 21I). **Gall-inducer:** not determined. **Parasitoids:** Hymenoptera. **Trail:** *Guapimirim:* Poço Verde (31.III.2022).

First record of gall on this plant genus.

***Emmeorhiza umbellata* (Spreng.) K. Schum. (n = 1)**

Gall: on bud, rosette, green, glabrous (Fig. 21J). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Cachoeira de Papel (14.IX.2021), Barragem to Cachoeira de Papel entrance (14.IX.2021).

Maia *et al.* (2008) reported a different gall on this plant species in SP.

***Faramea* cf. *truncata* (Vell.) Müll. Arg. (n = 2)**

Gall: on leaf midvein, fusiform to globoid, green or brown, glabrous, one- or multichambered (Fig. 21K). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* Primavera (13.IX.2021), Barragem to Cachoeira de Papel entrance (14.IX.2021), 360 (26.X.2021), Mozart-Catão to Primavera (25.X.2021), Bosque Santa Helena (26.XI.2021), Mozart-Catão (26.XI.2021), Suspensa (25.XI.2021), Poço do Beija-Flor (07.XII.2021).
Gall: on leaf, globoid, green, glabrous, multichambered (Fig. 21L). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021), Suspensa (25.XI.2021).

Maia (2013a) reported a tem gall on *Faramea* sp. in MG.

***Palicourea sessilis* (Vell.) C.M. Taylor (n = 4)**

Gall: on leaf, globoid, green, yellow or red, intralaminar, glabrous, smooth, one-chambered (Fig. 22A). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* Cachoeira Ceci-Peri (13.IX.2021), Barragem to Cachoeira de Papel (14.IX.2021), 360 (26.X.2021), Suspensa (25.XI.2021), Barragem to Casa do Pesquisador entrance (07.XII.2021), Poço do Beija-Flor (07.XII.2021), Barragem road (from Casa do Pesquisador to Alojamento (30.III.2022); *Guapimirim:* Recanto das Ruínas (28.III.2022), Poço Verde (31.III.2022), Circular (26.IV.2022), Museu Von Martius (27.IV.2022).
Gall: on leaf, globoid, green or yellow, with trichomes (Fig. 22B). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* 360 (26.X.2021), Mozart-Catão (27.X.2021), Suspensa (25.XI.2021).
Gall: on stem, globoid to fusiform, green or brown, glabrous, one- or multichambered (Fig. 22C). **Gall-inducer:** not determined. **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* Cartão Postal (15.IX.2021), Mozart-Catão to Primavera (25.X.2021), 360 (26.X.2021), Mozart-Catão (27.X.2021); *Guapimirim:* Poço Verde (31.III.2022).
Gall: on bud, globoid, green or brown, glabrous, one- or two-chambered (Fig. 22D). **Gall-inducer:** Cecidomyiidae.

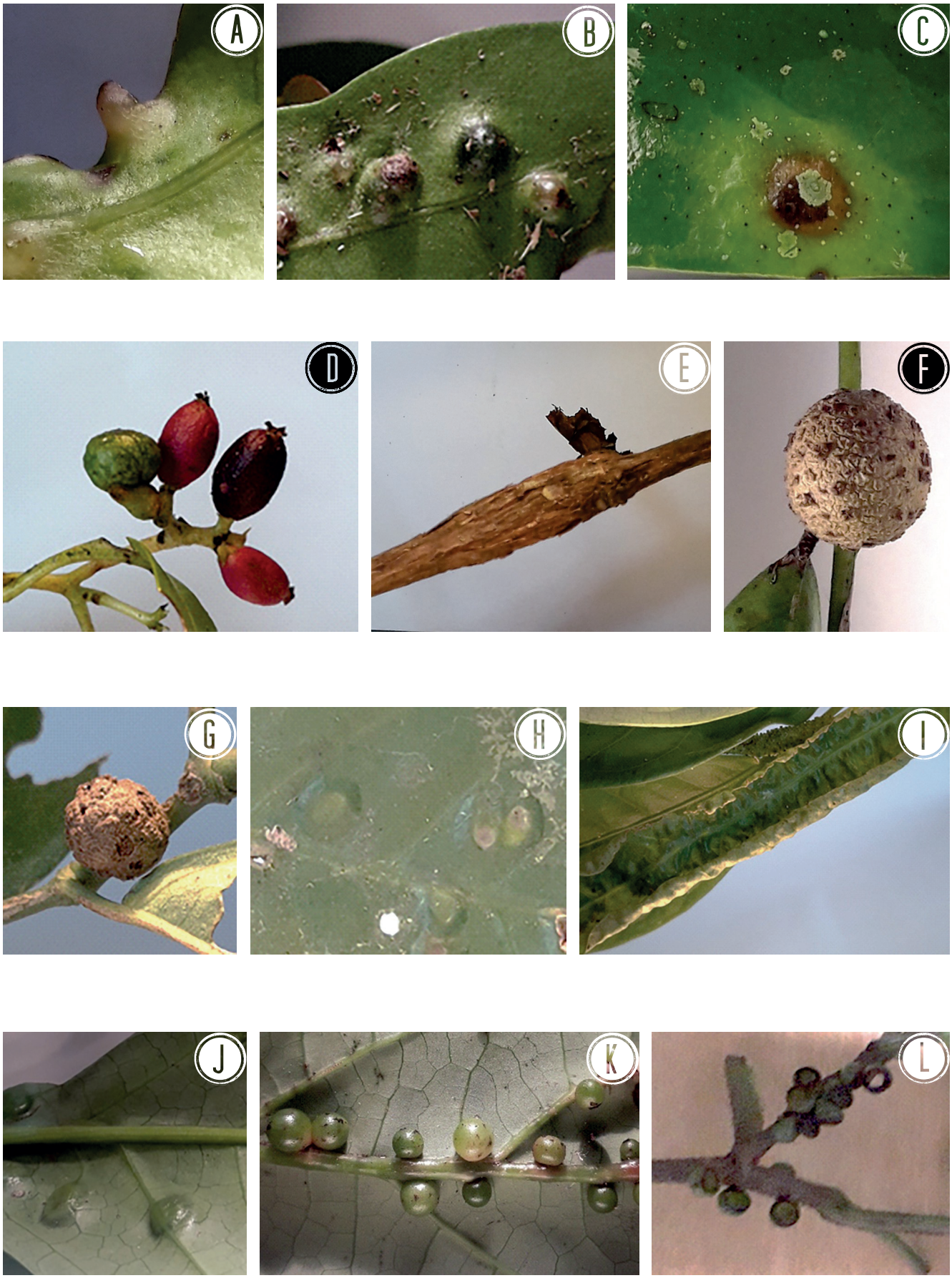

Figure 20. Insect galls of Parque Nacional da Serra dos Órgãos (RJ, Brazil): (A-D) On *Guapira opposita* (Vell.) Reitz. (Nyctaginaceae): (A) leaf gall, (B) leaf gall, (C) leaf gall, (D) fruit gall, (E) On *Fuchsia regia* (Vell.) Munz. (Onagraceae), stem gall, (F) On *Picramnia glazioviana* Engl. (Picramniaceae), bud gall, (G-L) On Piperaceae: (G-I) On *Piper anisum* (Spreng.) Angely, (G) bud gall, (H) leaf gall, (I) leaf gall, (J) On *Piper arboreum* Aubl., leaf gall, (K) On *Piper cernuum* Vell., leaf gall, (L) On *Piper pseudopothifolium* C. DC., bud gall.

Parasitoids: Hymenoptera. **Trails:** *Teresópolis:* Mozart-Catão to Primavera (25.X.2021), 360 (26.X.2021), Circular (26.IV.2022), Mozart-Catão (27.X.2021).

First records of galls on this plant species.

Several other species and morphospecies of *Palicourea* Aubl. host galls as reported by Almada & Fernandes (2011), Maia (2011), Silva *et al.* (2011), and Araújo *et al.* (2012) in AM, Araújo *et al.* (2011, 2014) in GO, Fernandes *et al.* (1997, 2001), Maia & Fernandes (2004), Carneiro *et al.* (2009), Coelho *et al.* (2013) and Maia (2013a) in MG, and Santos *et al.* (2012) in PE.

***Psychotria appendiculata* Müll. Arg. (n = 1)**

Gall: on leaf, conical, green, glabrous, one-chambered (Fig. 22E). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Cartão Postal (15.IX.2021).

First gall record on this plant species.

***Psychotria leiocarpa* Cham. & Schltdl. (n = 2)**

Gall: on leaf, globoid, furrowed, green, glabrous, one-chambered (Fig. 22F). **Gall-inducer:** *Dasineura* sp. (Cecidomyiidae). **Trails:** *Teresópolis:* Cachoeira Ceci-Peri (13.IX.2021), Casa do Pesquisador (13.IX.2021), Primavera (13.IX.2021), Barragem to Cachoeira de Papel entrance (14.IX.2021), Cartão Postal (15.IX.2021, 24.V.2022), Mozart-Catão to Primavera (25.X.2021), 360 (26.X.2021), Mozart-Catão (27.X.2021, 25.V.2022), Suspensa (25. XI.2021), Bosque Santa Helena (26.XI.2021), Poço Dois Irmãos (26.XI.2021), Centro de Operações to Camping (28.III.2022), Barragem road (between Camping and Alojamento) (25.IV.2022), Barragem road (from Casa do Pesquisador to Alojamento (30.III.2022); *Guapimirim:* Ponte Velha (29.III.2022), Poço Verde (31.III.2022), Circular (26.IV.2022), Museu Von Martius (27.IV.2022), Mãe d'Água (24.V.2022). This gall was previously recorded in SP (Maia *et al.,* 2008).

Gall on leaf, globoid, extralaminar, brown, with trichomes (Fig. 22G). **Gall-inducer:** Cecidomyiidae. **Trail:** *Guapimirim:* Circular (26.IV.2022).

First record of this gall morphotype on *P. leiocarpa.*

***Psychotria nuda* (Cham. & Schltdl.) Waw (n = 2)**

Gall: on leaf, globoid, brown, with trichomes (Fig. 22H). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Mozart-Catão (27.X.2021, 25.V.2022), Barragem road (between Camping and Alojamento) (25.IV.2022); *Guapimirim:* Mãe d'Água (24.V.2022).

Gall: on leaf, globoid, green, glabrous. **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Barragem road (between Camping and Alojamento) (25.IV.2022).

First records of gall on this plant species.

***Psychotria pallens* Gardner (n = 2)**

Gall: on stem, fusiform, brown, glabrous (Fig. 22I). **Gall-inducer:** not determined. **Parasitoids:** Hymenoptera. **Trail:** *Teresópolis:* Primavera (13.IX.2021).

Gall: on leaf midvein, fusiform, green, glabrous (Fig. 22J). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Primavera (13.IX.2021), Centro de Operações to Camping (28.III.2022); *Guapimirim:* Mãe d'Água (29.III.2022).

First records of gall on this plant species.

***Psychotria suterella* Müll. Arg. (n = 3)**

Gall: on leaf, conical, green or red, with short trichomes, one-chambered (Fig. 22k). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Successors:** Thysanoptera. **Trails:** *Teresópolis:* Cachoeira de Papel (14.IX.2021), 360 (26.X.2021), Suspensa (25.XI.2021, 26.XI.2021).

Gall: on stem, fusiform, green, glabrous, one-chambered (Fig. 22L). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Suspensa (26.XI.2021).

Gall: on bud, globoid, green, glabrous, one-chambered (Fig. 22M). **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trail:** *Teresópolis:* Suspensa (26.XI.2021).

First records of gall on this plant species.

***Psychotria* sp. 1 (n = 1)**

Gall: on leaf, conical, green, glabrous, one-chambered (Fig. 22N). **Gall-inducer:** Cecidomyiidae. **Trail:** *Guapimirim:* Araçari Camping (25.IV.2022).

***Psychotria* sp. 2 (n = 1)**

Gall: on leaf, conical, green, glabrous, one-chambered (Fig. 23A). **Gall-inducer:** Cecidomyiidae. **Trail:** *Guapimirim:* Ponte Velha (29.III.2022).

Galls on other congeneric species and morphospecies are known from AM (Silva *et al.,* 2011; Julião *et al.,* 2014), MG (Fernandes *et al.,* 1997; Carneiro *et al.,* 2009), MS (Julião *et al.,* 2002), and SP (Maia *et al.,* 2008, Saito & Urso-Guimarães, 2012).

***Randia armata* (Sw.) DC. (n = 1)**

Gall: on leaf midvein, fusiform, green, glabrous (Fig. 23B). **Gall-inducer:** not determined. **Trail:** *Guapimirim:* Circular (27.IV.2022).

Urso-Guimarães *et al.* (2017) reported this gall on MS. Silva *et al.* (2018) recorded a stem gall on the same host in BA. Maia & Mascarenhas (2017) reported a different leaf gall on *Randia* sp. in the Parque Nacional do Itatiaia.

***Rudgea jasminoides* (Cham.) Müll. Arg. (n = 4)**

Gall: on stem, fusiform, brown, glabrous, one or multichambered (Fig. 23C). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Cartão Postal (15.IX.2021), Mozart Catão to Primavera (25.X.2021), Mozart-Catão (27.X.2021, 25.V.2022), Bosque Santa Helena (26.XI.2021), Poço Dois Irmãos (26.XI.2021); *Guapimirim:* Circular (26.IV.2022).

Gall: on stem, globoid, green or brown, glabrous, one-chambered (Fig. 23D). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Mozart-Catão to Primavera (25.X.2021), Mozart-Catão (27.X.2021).

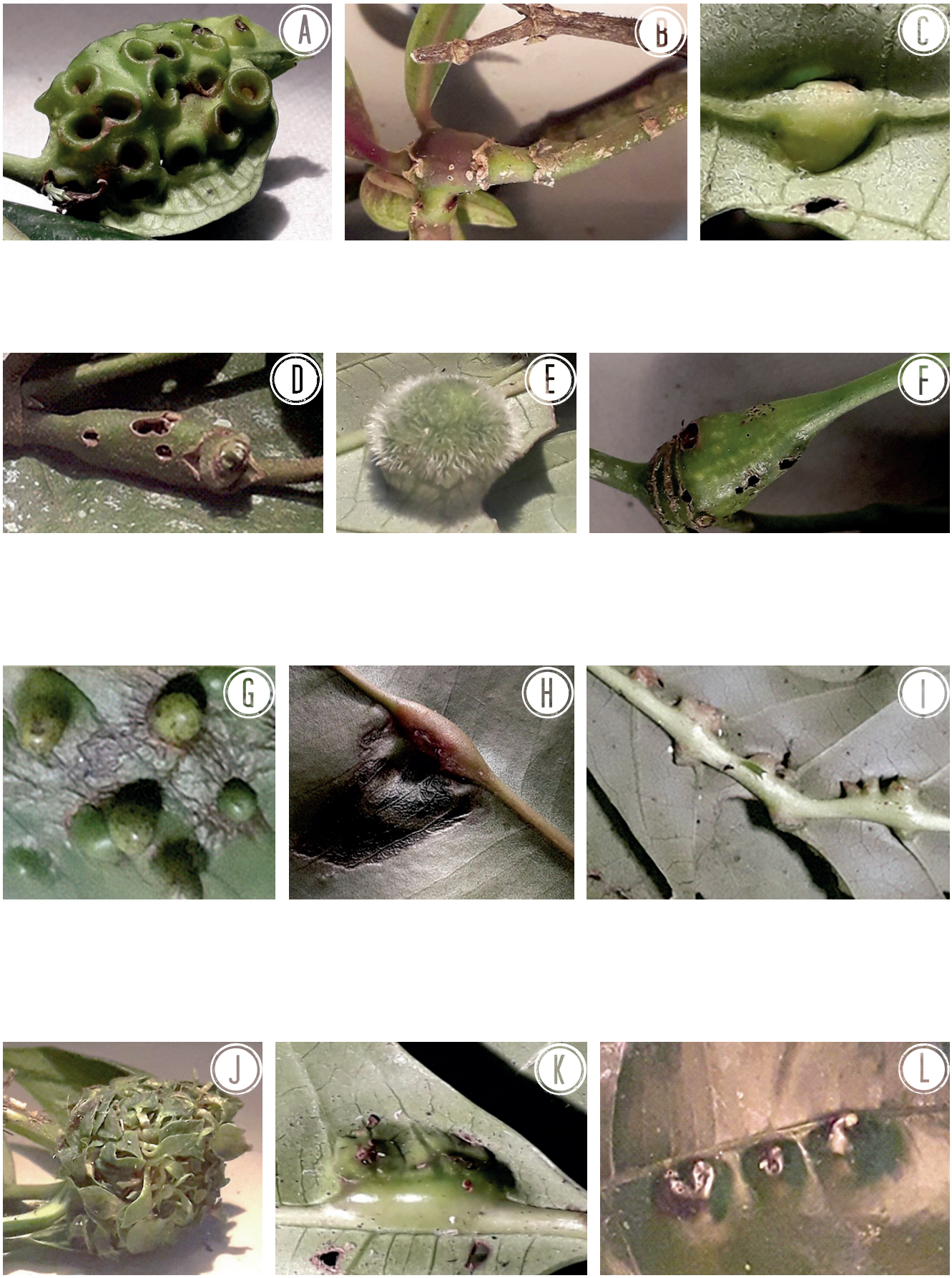

Figure 21. Insect galls of Parque Nacional da Serra dos Órgãos (RJ, Brazil): (A-F) On Piperaceae: (A-E) On *Piper rioense* Yunck.: (A) bud gall, (B) bud gall, (C) leaf gall, (D) leaf petiole gall, (E) leaf gall, (F) On *Piper sprengelianum* C. DC., leaf petiole gall, (G) On *Niphidium crassifolium* (L.) Lellinger (Polypodiaceae), leaf gall, (H) On *Cybianthus* sp. (Primulaceae), leaf vein gall, (I-L) On Rubiaceae: (I) On *Bathysa mendoncaei* K. Schum, leaf vein gall, (J) On *Emmeorhiza umbellata* (Spreng.) K. Schum., bud gall, (K-L) On *Faramea* cf. *truncata* (Vell.) Müll. Arg.: (K) leaf vein gall, (L) leaf gall.

Gall: on leaf vein, fusiform, green, glabrous, one-chambered (Fig. 23E). **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Mozart Catão to Primavera (25.X.2021), Mozart-Catão (27.X.2021).
Gall: on leaf, globoid, brown, glabrous, multichambered (Fig. 23F). Gall-inducer not determined. **Trail:** *Guapimirim:* Circular (27.IV.2022).

First records of gall on this plant species.

Galls on other congeneric species are known from Parque Nacional do Itatiaia (Maia & Mascarenhas, 2017) and RS (Toma & Mendonça-Jr., 2013).

***Rudgea* sp. 1 (n = 2)**

Gall: on leaf, globoid, intralaminar, green, glabrous, one-chambered (Fig. 23G). **Gall-inducer:** Cecidomyiidae. **Trails:** *Guapimirim:* Araçari Camping (25.IV.2022); *Teresópolis:* Mozart-Catão to Primavera (25.X.2021), Mozart-Catão (27.X.2021), Barragem road (between Camping and Alojamento) (25.IV.2022).
Gall: on leaf vein, fusiform, green, glabrous, one-chambered (Fig. 23H). **Gall-inducer:** Cecidomyiidae. **Trails:** *Guapimirim:* Araçari Camping (25.IV.2022); *Teresópolis:* Mozart-Catão to Primavera (25.X.2021), Mozart-Catão (27.X.2021). Barragem road (between Camping and Alojamento (25.IV.2022).

***Rudgea* sp. 2 (n = 1)**

Gall: on leaf, globoid, green, glabrous, one-chambered (Fig. 23I). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Trilha 360 (26.X.2021), Mozart-Catão (25.V.2022); *Guapimirim:* Alameda Von Spix (25.V.2022).

***Rudgea* sp. 3 (n = 1)**

Gall: on leaf, lenticular, green, glabrous, one-chambered (Fig. 23J). **Gall-inducer:** not determined. **Parasitoids:** Hymenoptera. **Trail:** *Guapimirim:* Mãe d'Água (24.V.2022).

Salicaceae (n = 3)

***Casearia obliqua* Spreng. (n = 1)**

Gall: on leaf midvein, fusiform, green, glabrous, two-chambered. **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Barragem road (between Primavera entrances) (13.IX.2021).

First gall record on this plant species.

***Casearia pauciflora* Cambess. (n = 2)**

Gall: on bud, cylindrical, green or brown, glabrous, multichambered (Fig. 23K). **Gall-inducer:** not determined. **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* Cartão Postal (15.IX.2021), Mozart-Catão (27.X.2021), Suspensa (25.XI.2021), Barragem road (from Casa do Pesquisador to Alojamento) (30.III.2022).

Gall: on leaf petiole, green, glabrous, one-chambered (Fig. 23L). **Gall-inducer:** not determined. **Parasitoids:** Hymenoptera. **Trail:** *Teresópolis:* Mozart-Catão (27.X.2021).

First records of gall on this plant species.

Other galls were reported in this plant genus in AM (Almada & Fernandes, 2011; Maia, 2011; Araújo *et al.,* 2012; Julião *et al.,* 2014), GO (Araújo *et al.,* 2014), PE (Santos *et al.,* 2012), MS (Urso-Guimarães *et al.,* 2017; Ascendino & Maia, 2018), and MG (Fernandes & Negreiros, 2006; Coelho *et al.,* 2009; Luz *et al.,* 2012; Maia, 2013a).

Sapindaceae (n = 15)

***Paullinia carpopoda* Cambess. (n = 2)**

Gall: on leaf, conical, green, one-chambered, with trichomes at apex (Fig. 24A). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Casa do Pesquisador (14.IX.2021), Poço Dois Irmãos (26.XI.2021).
Gall: on leaf, globoid, intralaminar, brown, glabrous (Fig. 24B) **Gall-inducer:** not determined. **Trails:** *Teresópolis:* Casa do Pesquisador (14.IX.2021), Poço Dois Irmãos (26.XI.2021).

First records of gall on this plant species.

***Paullinia* sp. (n = 2)**

Gall: on stem, brown, woody, glabrous, one-chambered (Fig. 24c). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Casa do Pesquisador (14.IX.2021).
Gall: on leaf, conical, red, glabrous, one-chambered (Fig. 24D). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Casa do Pesquisador (14.IX.2021).

Several galls are known on congeneric species or morphospecies in AM (Araújo *et al.,* 2012), MS (Julião *et al.,* 2002; Ascendino & Maia, 2018), PE (Santos *et al.,* 2012), MG (Fernandes *et al.,* 2001; Maia & Fernandes, 2004), RJ (Maia, 2001; Maia & Souza, 2013; Maia & Carvalho-Fernandes, 2016), and SP (Maia *et al.,* 2008).

***Serjania caracasana* (Jacq.) Willd. (n = 4)**

Gall: on leaf midvein, fusiform, brown, glabrous, one-chambered (Fig. 24E). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Mozart-Catão (27.X.2021). Julião *et al.* (2002) reported this same gall in MS.
Gall: on stem, unilateral, fusiform, brown, woody, glabrous (Fig. 24F). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Mozart-Catão (27.X.2021).
Gall: on bud, globoid, brown, glabrous, multichambered (Fig. 24G). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Mozart-Catão (27.X.2021).
Gall: on stem, fusiform, brown, woody, glabrous, multichambered (Fig. 24H). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Mozart-Catão (27.X.2021).

Other gall morphotypes were reported by Fernandes *et al.* (2001) reported in MG and Urso-Guimarães *et al.* (2017) in MS.

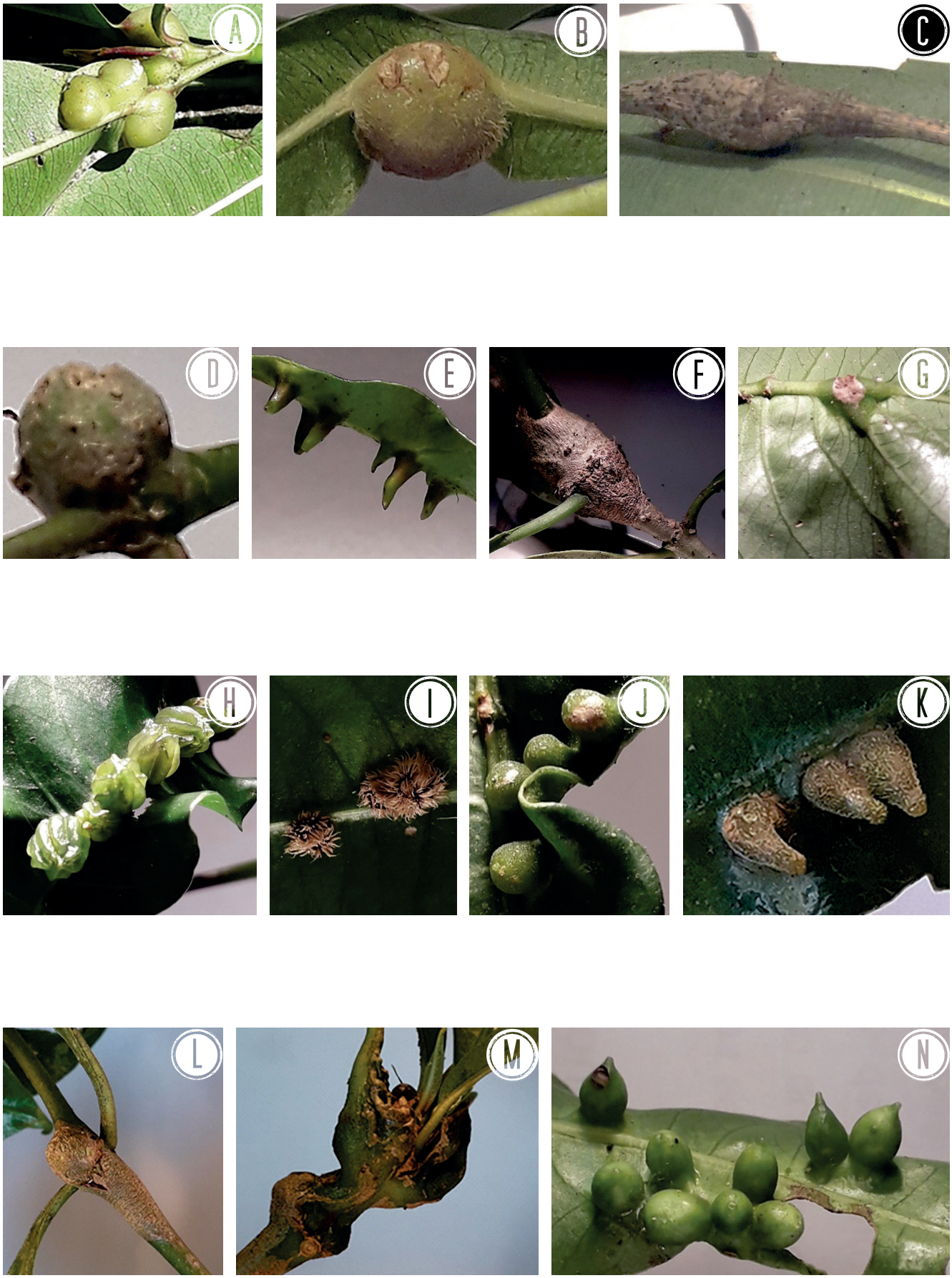

Figure 22. Insect galls of Parque Nacional da Serra dos Órgãos (RJ, Brazil): (A-L) On Rubiaceae: (A-D) On *Palicourea sessilis* (Vell.) C.M. Taylor: (A) leaf gall, (B) leaf gall, (C) stem gall, (D) bud gall, (E) On *Psychotria appendiculata* Müll. Arg., leaf gall, (F-G) On *Psychotria leiocarpa* Cham. & Schltdl.: (F) leaf gall, (G) leaf gall, (H) On *Psychotria nuda* (Cham. & Schltdl.) Waw, leaf gall, (I-J) On *Psychotria pallens* Gardner: (I) stem gall, (J) leaf petiole gall, (K-M) On *Psychotria suterella* Müll. Arg.: (K) leaf gall, (L) stem gall, (M) bud gall, (N) On *Psychotria* sp. 1, leaf gall.

***Serjania corrugata* Radlk. (n = 2)**

Gall: on stem, fusiform, woody, brown, with trichomes (Fig. 24I). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Cartão Postal (15.IX.2021).
Gall: on leaf, lenticular, brown (dried), glabrous (Fig. 24J). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Cartão Postal (15.IX.2021).

First records of gall on this plant species.

***Serjania* sp. (n = 3)**

Gall: on leaf midvein, globoid, intralaminar, green, glabrous (Fig. 24K). **Gall-inducer:** not determined. **Trail:** *Guapimirim:* Araçari Camping (25.IV.2022).
Gall: on leaf, conical, green, glabrous, one-chambered. (Fig. 24L). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Casa do Pesquisador (13.IX.2021); *Guapimirim:* Alameda Von Pix to Jucu Camping (25.V.2022.).
Gall: on stem, globoid, brown, glabrous, one-chambered. **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Suspensa (25.XI.2021).

Several gall morphotypes are known on congeneric species and morphospecies in AM (Almada & Fernandes, 2011; Araújo *et al.,* 2012), GO (Araújo *et al.,* 2011, 2015), BA (Vieira *et al.,* 2018), MG (Fernandes *et al.,* 1997; Coelho *et al.,* 2009; Luz *et al.,* 2012; Costa & Araújo, 2019), and SP (Ribeiro *et al.,* 2019; Saito & Urso-Guimarães, 2012).

Sapindaceae sp. (n = 2)

Gall: on leaf, globoid, intralaminar, green, glabrous. **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Casa do Pesquisador (14.IX.2021).
Gall: on leaf, globoid, brown, glabrous. **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Barragem to Casa do Pesquisador entrance (07.XII.2021).

Sapotaceae (n = 3)

***Chrysophyllum flexuosum* Mart. (n = 3)**

Gall: on bud, globoid to fusiform, green, glabrous (Fig. 24M). **Gall-inducer:** Cecidomyiidae. **Trails:** *Guapimirim:* Ponte Velha (29.III.2022), Poço Verde (31.III.2022), Circular (26.IV.2022).
Gall: on leaf, globoid, intralaminar, green, glabrous, one-chambered (Fig. 24N). **Gall-inducer:** not determined. **Trail:** *Guapimirim:* Mãe d'Água (24.V.2022).
Gall: on bud, pedunculated, globoid basally, with pointed apex, brown, glabrous, one-chambered (Fig. 25A). **Gall-inducer:** Cecidomyiidae. **Trail:** *Guapimirim:* Mãe d'Água (24.V.2022).

First records of gall on this plant species.

Galls on other congeneric species are known from AM (Julião *et al.,* 2014), GO (Araújo *et al.,* 2015), MS (Urso-Guimarães *et al.,* 2017), PE (Santos *et al.,* 2012), and RJ (Carvalho-Fernandes *et al.,* 2016).

Smilacaceae (n = 2)

***Smilax fluminensis* Steud. (n = 2)**

Gall: on leaf, globoid, intralaminar, green, glabrous, one-chambered (Fig. 25B). **Gall-inducer:** not determined. **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* Barragem road (between Camping and Alojamento) (25.IV.2022), Mozart-Catão (25.V.2022). This gall was reported by Julião *et al.* (2002) in MS and Araújo *et al.* (2015) in GO.
Gall: on leaf vein, fusiform, green, glabrous (Fig. 25C). **Gall-inducer:** not determined. **Parasitoids:** Hymenoptera. **Trails:** *Teresópolis:* Cartão Postal (24.V.2022), Mozart Catão (25.V.2022).

Other galls have been reported on different species and morphospecies of *Smilax* L. in AM (Almada & Fernandes, 2011), PE (Santos *et al.,* 2011), GO (Araújo *et al.,* 2011), MS (Urso-Guimarães *et al.,* 2017; Ascendino & Maia, 2018), MG (Maia & Fernandes, 2004; Carneiro *et al.,* 2009; Coelho *et al.,* 2009; Malves & Frieiro-Costa, 2012; Maia, 2013a), RJ (Maia, 2013b; Maia & Carvalho-Fernandes, 2016), SP (Urso-Guimarães *et al.,* 2003; Urso-Guimarães & Scareli-Santos, 2006; Maia *et al.,* 2008; Ribeiro *et al.,* 2019), and RS (Mendonça-Jr. *et al.,* 2014).

Solanaceae (n = 4)

***Athenaea fasciculata* (Vell.) I.M.C. Rodrigues (n = 1)**

Gall: on stem, fusiform, green, glabrous, multichambered (Fig. 25D). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Cartão Postal (24.V.2022), Cartão Postal (24.V.2022).

First gall record on this plant genus.

***Solanum piluliferum* Dunal (n = 1)**

Gall: on bud, globoid, green, with brown trichomes, one-chambered (Fig. 25E). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Mozart-Catão (27.X.2021).

Maia & Mascarenhas (2017) reported other galls on this plant species in the Parque Nacional do Itatiaia.

***Solanum swartzianum* Roem. & Schult. (n = 2)**

Gall: on leaf, lenticular, green, glabrous, one-chambered. **Trail:** *Guapimirim:* Ponte Velha (29.III.2022).
Gall: on leaf, globoid, green, with trichomes (Fig. 25F). **Gall-inducer:** Ceciodmyiidae. **Trail:** *Guapimirim:* Poço Verde (31.III.2022).

Several galls have been reported in congeneric species and morphospecies in AM (Almada & Fernandes, 2011), GO (Araújo *et al.,* 2015), MG (Fernandes *et al.,* 2001; Fernandes & Negreiros, 2006; Malves & Frieiro-Costa, 2012; Maia 2013a, 2014), MS (Urso-Guimarães *et al.,* 2017, ES (Maia *et al.,* 2014), Parque Nacional do Itatiaia (Maia & Mascarenhas, 2017), RJ (Maia, 2001; Oliveira & Maia, 2005; Rodrigues *et al.,* 2014; Carvalho-Fernandes *et al.,* 2016; Maia & Siqueira, 2020), SP (Maia *et al.,* 2008), PR

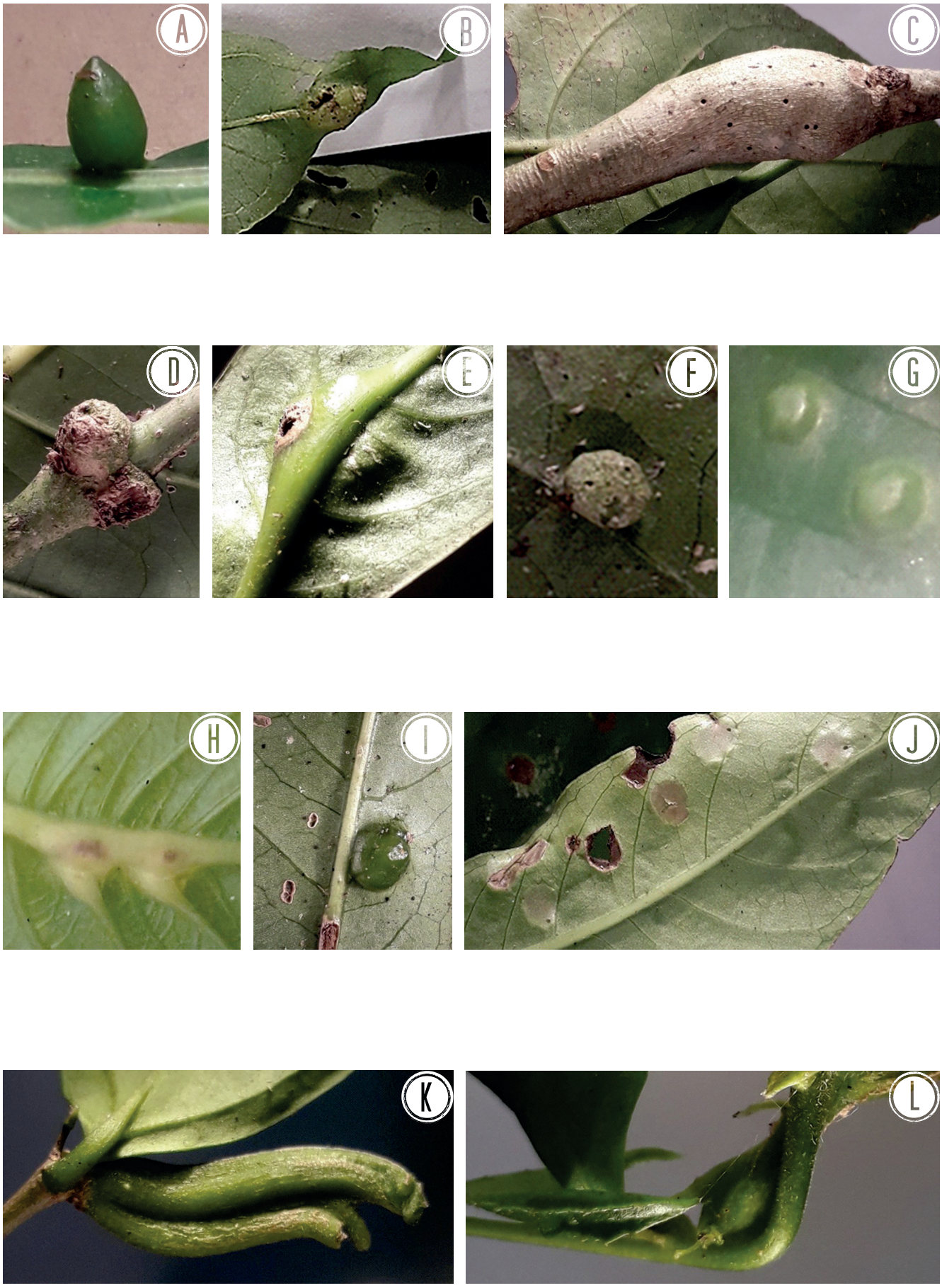

Figure 23. Insect galls of Parque Nacional da Serra dos Órgãos (RJ, Brazil): (A-J) On Rubiaceae: (A) On *Psychotria* sp. 2, leaf gall, (B) On *Randia armata* (Sw.) DC., leaf gall, (C-F) On *Rudgea jasminoides* (Cham) Müll. Arg.: (C) stem gall, (D) stem gall, (E) leaf vein gall, (F) leaf gall, (G-H) On *Rudgea* sp. 1, (G) leaf gall, (H) leaf gall, (I) On *Rudgea* sp. 2, leaf gall, (J) On *Rudgea* sp. 3, leaf gall, (K-L) On *Casearia pauciflora* Cambess. (Salicaceae): (K) bud gall, (L) leaf petiole gall.

(Santos & Ribeiro, 2015), SC (Arriola & Melo-Júnior, 2016), and RS (Toma & Mendonça-Jr., 2013).

Verbenaceae (n = 3)

***Lantana camara* L. (n = 2)**

Gall: on leaf, cylindrical, green with reddish apex, with green trichomes, one-chambered (Fig. 25G). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Barragem to Cachoeira do Papel entrance (14.IX.2021). This gall was previously reported by Fernandes *et al.* (2001) in MG.
Gall: on stem, fusiform, brown, glabrous. **Gall-inducer:** Cecidomyiidae. **Parasitoids:** Hymenoptera. **Trail:** *Teresópolis:* Barragem to Cachoeira do Papel entrance (14.IX.2021). This gall was already known from PE (Santos *et al.,* 2011), MG (Maia, 2013a), RJ (Rodrigues *et al.,* 2014; Maia & Carvalho-Fernandes, 2016; Carvalho-Fernandes *et al.,* 2016; Maia & Siqueira, 2020), PB and RN (Marinho *et al.,* 2023).

***Lantana robusta* Schauer (n = 1)**

Gall: on stem, fusiform, brown, glabrous, one-chambered (Fig. 25H). **Gall-inducer:** not determined. **Trail:** *Teresópolis:* Cartão Postal (15.IX.2021).

First gall record on this plant genus.

Violaceae (n = 1)

***Anchietea pyrifolia* (Mart.) G. Don. (n = 1)**

Gall: on stem, fusiform, brown or red, glabrous, one-chambered (Fig. 25I). **Gall-inducer:** Cecidomyiidae. **Trails:** *Teresópolis:* Barragem to Cachoeira de Papel entrance (14.IX.2021), 360 (26.X.2021).

First gall record on this plant genus.

Vitaceae (n = 1)

***Clematicissus striata* (Ruiz. & Pav.) Lombardi (n = 1)**

Gall: on bud, globoid, green, glabrous, multichambered (Fig. 25J). **Gall-inducer:** Cecidomyiidae. **Trail:** *Teresópolis:* Cachoeira do Papel (14.IX.2021).

First gall record on this plant genus.

Galls on other genera of Vitaceae, *Cissus* L. and *Rinorea* Aubl. are known. The former from AL (Marinho *et al.,* 2023), GO (Silva *et al.,* 2018), MS (Julião *et al.,* 2002), Parque Nacional do Itatiaia (Maia & Mascarenhas, 2017), MG (Costa & Araújo, 2019), and RS (Goetz *et al.,* 2018), and the latter from PE (Santos *et al.,* 2012).

DISCUSSION

We found 290 morphotypes of insect galls in the PARNASO. Other inventories in Atlantic forest areas have been recorded between from 15 to and 406 gall morphotypes (Table 10). Among them, PARNASO ranks second in gall richness. Several factors can explain this large variation: authors investigated different phytophysiognomies and adopted different sampling methodologies; study areas differed in total size, from short fragments to large protected forests; sampled areas differed in size, as well as the sampling frequency, total sampling time, and number of colletors, which resulted in different collection efforts.

All super host taxa pointed out in the present study were already known from previous inventories in forest formations of the Atlantic forest, except Rubiaceae (Table 11). The high gall richness of the families Myrtaceae, Melastomataceae, Asteraceae, Fabaceae and genera *Mikania* (Asteraceae), *Miconia* (Melastomataceae) and *Eugenia* (Myrtaceae) can be explained by their high richness of species as the plant richness hypothesis predicts (Southwood, 1960, 1961). *Guapira opposita* highlights in several inventories in restinga and forest formation areas as the plant species with the greatest richness of gall (Santos *et al.,* 2012; Maia, 2013a; Maia & Souza, 2013; Maia *et al.,* 2014; Rodrigues *et al.,* 2014; Arriola & Melo-Júnior, 2016; and Melo-Júnior *et al.,* 2018). No explanation has been proposed for this, but as *G. opposita* has a wide geographic distribution and abundant populations, such gall richness could be related to these facts, as predicted by the geographic area and resource concentration hypotheses (Southwood, 1960; Root, 1973).

Data on origin, geographic distribution and conservation status of the host plants are important since gall-inducing species are generally species-specific (Carneiro *et al.,* 2009). Their distribution depends first of all on the host plant distribution. Furthermore, if they are associated with endemic hosts, they are co-endemic. In the same way, if they are associated with endangered or near threathned hosts, they are co-endangered or co-near threathned. We highlight that PARNASO shelters 69 gall-inducing species endemic to Brazil, 23 of which occur only in the Atlantic forest. Furthermore PARNASO is home to at least 12 unknown gall-inducing species with some degree of threat.

Most galls occurred on leaves. This pattern has been reported in almost all Brazilian inventories, probably because leaves are abundant, frequent, with high levels of nutritional reserves, and more plastic than other plant organs (Castro *et al.,* 2012; Isaias *et al.,* 2013).

The predominance of globoid shape, green color, and glabrous surface confirm the pattern found in other inventories in dense ombrophilous forest areas in Brazil (Maia *et al.,* 2014; Maia & Mascarenhas, 2017). Globoid galls occurred mainly on leaves while fusiform galls on stems and veins. These shapes are related to patterns of cell division and directions of elongation, which differ between leaves and stems (Oliveira & Isaias, 2010). Ten gall morphotypes varied in shape. These variations can be explained by the stage of gall development (Santos *et al.,* 2019), sex of the inducer (Gonçalves *et al.,* 2005, 2022) and/or presence of inquilines (Luz & Mendonça-Jr., 2019). Most galls displayed the same color of the host

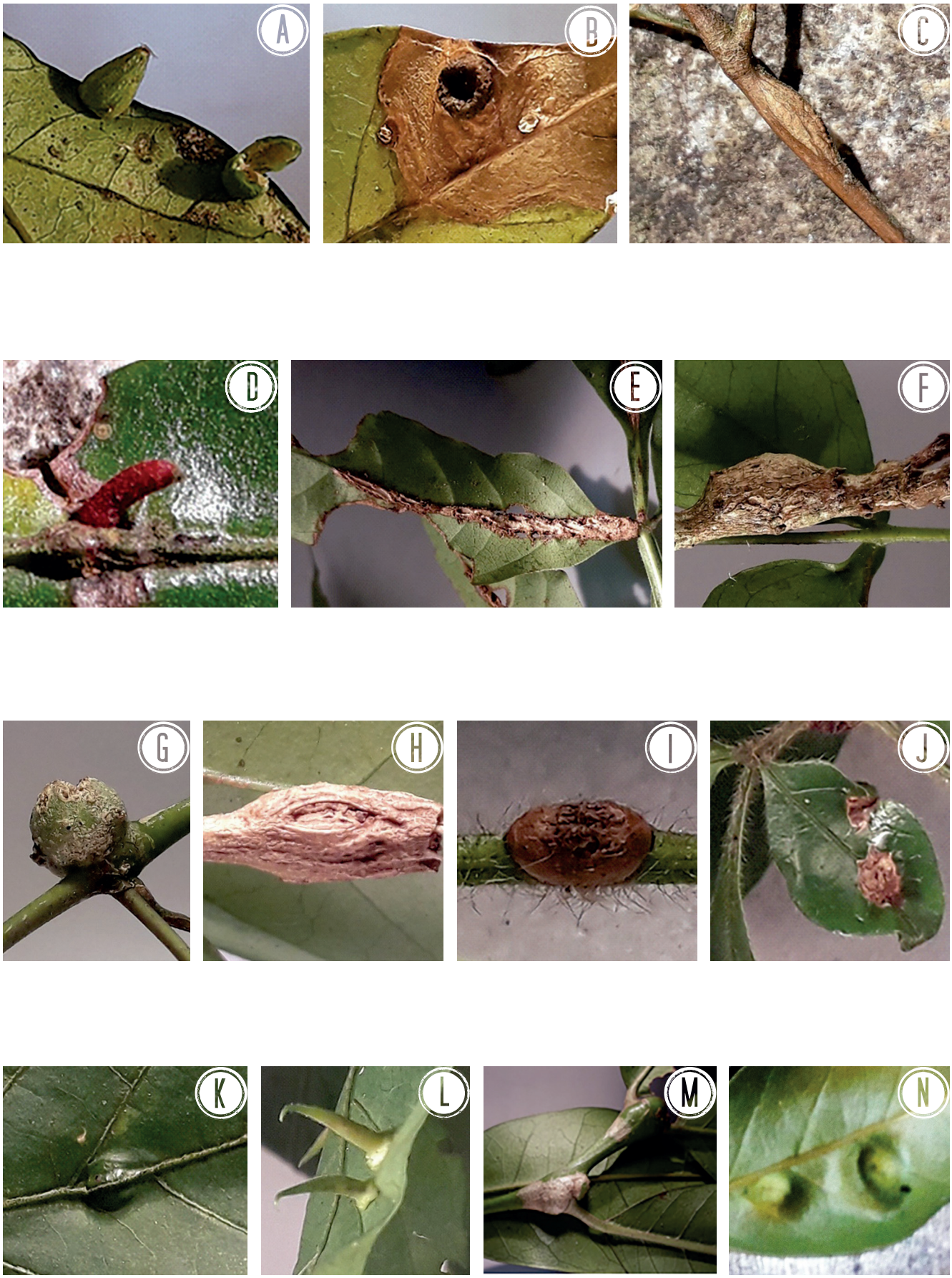

Figure 24. Insect galls of Parque Nacional da Serra dos Órgãos (RJ, Brazil): (A-L) On Sapindaceae: (A-B) On *Paullinia carpopoda* Cambess.: (A) leaf gall, (B) leaf gall, (C-D) On *Paullinia* sp.: (C) stem gall, (D) leaf gall, (E-H) On *Serjania caracasana* (Jacq.) Willd.: (E) leaf vein gall, (F) stem gall, (G) bud gall, (H) stem gall, (I-J) On *Serjania corrugata* Radlk.: (I) stem gall, (J) leaf gall, (K-L) On *Serjania* sp.: (K) leaf gall, (L) leaf gall, (M-N) On *Chrysophyllum flexuosum* Mart. (Sapotaceae): (M) bud gall, (N) leaf gall.

plant organ. Green color indicates the presence of chlorophyll, which can be an advantage, since it enables photosynthetic activity. Some galls varied in color. This variation can be related to the gall maturation stage, plant organ or light exposition (Lev-Yadun, 2016). Deiscent galls are generally brown. Most galls were glabrous, while few had trichomes. Trichomes play a protective role against water loss and attack by predators and parasites (Stone & Schönrogge, 2003). In the present study, galls were collected in forest formations with high humidity, so in areas with low chances of desiccation. Furthermore, our results pointed out a low frequency of parasitoids and predators, indicating that these guilds probably have little significant impact on gall morphology.

Galls were induced mainly by Cecidomyiidae, the most diverse and frequent gall-inducers in all zoogeographic regions (Gagné, 1994). The secondary fauna included parasitoids, successors, cecidophagous, and predators. Parasitoids were the most frequent, being reported in 20.0% of the gall morphotypes (Table 12). In other inventories in forest formations of Atlantic forest, the frequency varies from 6% to 22.9%, so the value reported in PARNASO is included in this range and can be considered as one of the highest. But when compared to inventories in restinga areas, this value is low (Table 12). Successors were represented by Collembola, Hemiptera and Thysanoptera, cecidophagous only by Lepidoptera, and predators only by spiders. In other inventories, Acari, Araneae, Cecidomyiidae (Diptera), Coleoptera, Collembola, and Formicidae were cited as successors, Pseudoscorpiones and Diptera as predators, Coleoptera, Diptera, Hemiptera, Lepidoptera, and Thysanoptera as ce-

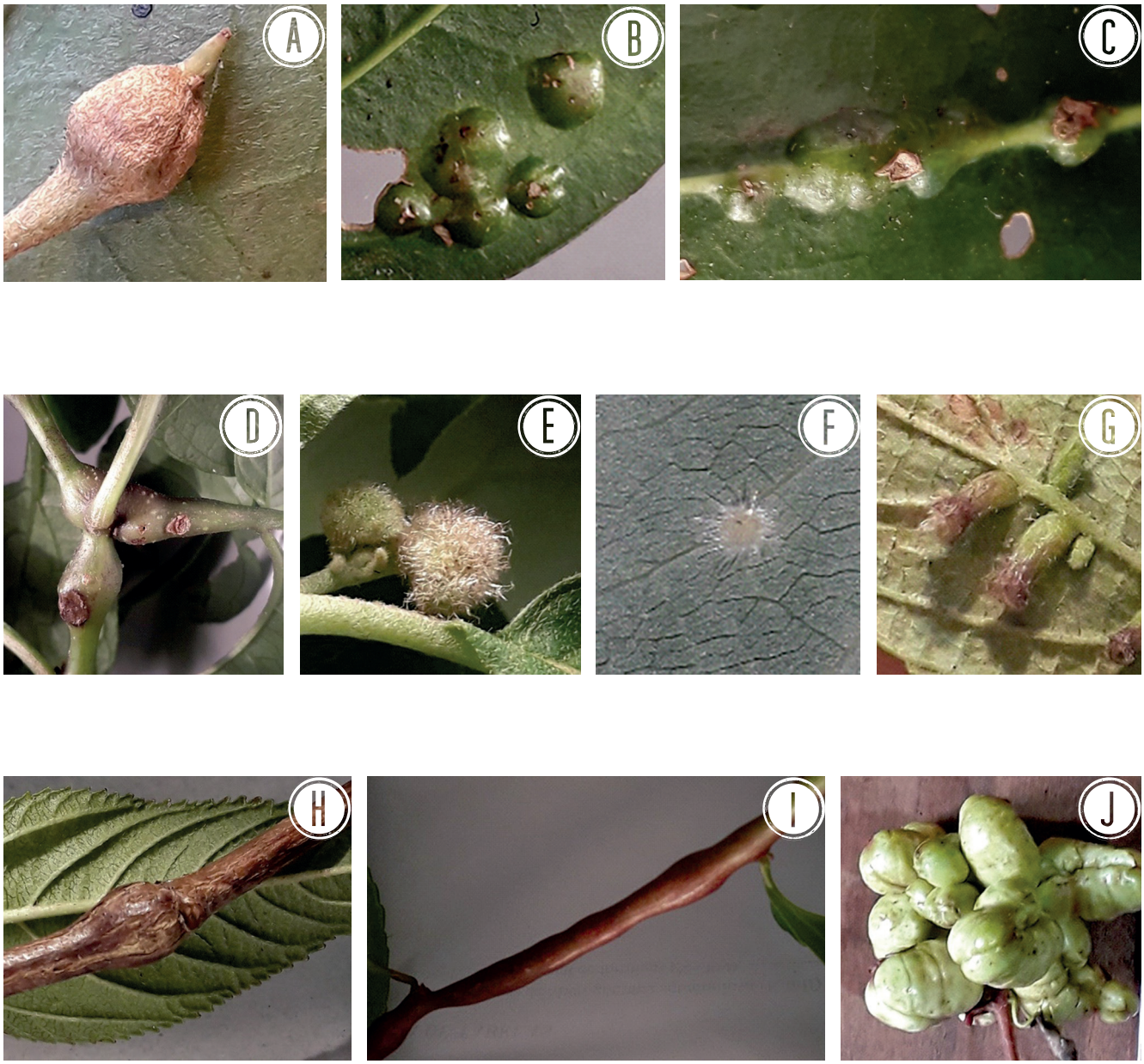

Figure 25. Insect galls of Parque Nacional da Serra dos Órgãos (RJ, Brazil): (A) On *Chrysophyllum flexuosum* Mart. (Sapotaceae), bud gall, (B-C) On *Smilax fluminensis* Steud. (Smilacaceae): (B) leaf gall, (C) leaf vein gall, (D-F) On Solanaceae: (D) On *Athenaea fasciculata* (Vell.) I.M.C., stem gall, (E) On *Solanum piluliferum* Dunal, bud gall, (F) On *Solanum swartizianum* Roem. & Schult., leaf gall, (G-H) On Verbenaceae: (G) On *Lantana camara* L, leaf gall, (H) On *Lantana robusta* Schauer, stem gall, (I) On *Anchietea pyrifolia* (Mart.) G. Don. (Violaceae), stem gall, (J) On *Clematicissus striata* (Ruiz. & Pav.) Lombardi (Vitaceae), bud gall.

Table 10. Insect gall richness in inventories in forest formations of the Atlantic forest.

Locality	Phytophysiognomy	Gall richness	Collection efforts	Reference
Parque Estadual Dois Irmãos (Pernambuco)	Evergreen forest	32	May, 2005 to March, 2006 (no data)	Fernandes *et al.* (2009)
Canela and Santa Tereza (Rio Grande do Sul)	Deciduous and semideciduous forests	89	2015 to 2017 (8 samples)	Goetz *et al.* (2018)
Telêmaco Borba (Paraná)	Semideciduous seasonal forest	41	March, 2013 (1 sample)	Santos & Ribeiro (2015)
Araranguá, Içara, Maracajá (Santa Catarina)	Dense ombrophilous forest	15	March to May, 2009	Flor (2020)
Sorocaba (São Paulo)	Semideciduous seasonal forest	113	2014 to 2016 (trimonthly samples)	Ansaloni *et al.* (2018)
Serra Negra do Funil (Minas Gerais)	Semideciduous seasonal and dense ombrophilous forests	63	October, 2015 to May, 2016 (monthly samples)	Maia & Mascarenhas (2022)
Santa Teresa (Espírito Santo)	Dense ombrophilous forest	265	June, 2007 to August, 2009	Maia *et al.* (2014)
Parque Nacional do Itatiaia	Dense ombrophilous forest	406	February, 2014 to December, 2015 (monthly Samples)	Maia & Mascarenhas (2017)
Reserva Biológica União	Dense ombrophilous forest	153	January to October, 2013 (bimonthly samples)	Maia & Siqueira (2020)
São Francisco de Itabapoana (Rio de Janeiro)	Semideciduous seasonal forest	143	March, 2013 to April, 2014 (bimonthly Samples)	Maia & Carvalho-Fernandes (2016)
Volta Redonda (Rio de Janeiro)	Semideciduous seasonal forest	43	April to June, 2015	Flor *et al.* (2018)

Table 11. Plant families, genera and species with the highest insect gall richness in inventories in forest formations of the Atlantic forest.

Locality	Plant family	Plant genera	Plant species	Reference
Canela and Santa Tereza (Rio Grande do Sul)	Asteraceae (n = 18) Piperaceae (n = 11)	*Piper* L. (n = 11) *Mikania* Willd. (n = 10)	*Piper aduncum* L. (n = 8) *Mikania glomerata* Spreng. (n = 6)	Goetz *et al.* (2018)
Telêmaco Borba (Paraná)	Solanaceae (n = 4) Asteraceae (n = 4) Euphorbiaceae (n = 4)	—	—	Santos & Ribeiro (2015)
Sorocaba (São Paulo)	Fabaceae (n = 26) Malpighiaceae (n = 19) Myrtaceae (n = 11)	*Copaifera* L. (Fabaceae) (n = 16)	*Copaifera langsdorffii* Desf. (n = 16)	Ansaloni *et al.* (2018)
Serra Negra do Funil (Minas Gerais)	Fabaceae (n = 12) and Asteraceae (n = 10)	—	—	Maia & Mascarenhas (2022)
Santa Teresa (Espírito Santo)	Asteraceae (n = 36) Fabaceae (n = 32) and Myrtaceae (n = 27)	*Mikania* Willd. (Asteraceae) (n = 24) *Myrcia* DC. ex. Guill. (Myrtaceae) (n = 24) and *Inga* Mill. (Fabaceae) (n = 12)	*Guapira opposita* (Vell.) Reitz. (Nyctaginaceae) (n = 8)	Maia *et al.* (2014)
Parque Nacional do Itatiaia	Asteraceae (n = 93) Melastomataceae (n = 66) Fabaceae (n = 29)	*Mikania* Willd. (Asteraceae) (n = 36) *Miconia* Ruiz & Pav. (n = 26) *Tibouchina* Aubl (n = 26)	*Mikania glomerata* Spreng. (n = 8)	Maia & Mascarenhas (2017)
Reserva Biológica União	Asteraceae (n = 15) Bignoniaceae (n = 15) Fabaceae (n = 15)	*Mikania* Willd. (Asteraceae)	*Mikania* Willd. (Asteraceae) (n = 10) and *Myrcia* DC. (n = 9)	Maia & Siqueira, 2020
São Francisco de Itabapoana (Rio de Janeiro)	Fabaceae (n = 28) Myrtaceae (n = 13) Sapindacae (n = 13)	*Trichilia* P. Browne (Meliaceae) (n = 9), *Tontelea* Miers (Hippocrateaceae), *Eugenia* L. (Myrtaceae) (n = 7), and *Serjania* Mill. (Sapindaceae) (n = 7)	—	Maia & Carvalho-Fernandes (2016)
Volta Redonda (Rio de Janeiro)	Sapindaceae (n = 6) Euphorbiaceae (n = 5)	*Allophylus* L. (Sapindaceae) (n = 6)	*Allophylus edulis* (A. St.-Hill. *et al.*) Hieron ex Niederl. (n = 6)	Flor *et al.* (2018)

Table 12. Frequency of parasitoids in insect galls in inventories in forest formations and restinga areas of the Atlantic forest.

Locality	Phytophysiognomy	Frequency of parasitoids	Reference
Itamonte, MG	Forest formation	6.0%	Maia (2014)
Sorocaba, SP	Forest formation	9.7%	Ansaloni *et al.* (2018)
São Francisco de Itabapoana, RJ	Forest formation	14.6%	Maia & Carvalho-Fernandes (2016)
Volta Redonda, RJ	Forest formation	16.3%	Flor *et al.* (2018)
Reserva Biológica União (Southeastern Brazil)	Forest formation	18.9%	Maia & Siqueira (2020)
Parque Nacional do Itatiaia		22.9%	Maia & Mascarenhas (2017)
Guarapari, ES	Restinga	31.6%	Bregonci *et al.* (2010)
Mangaratiba, RJ	Restinga	36.7%	Rodrigues *et al.* (2014)
Bertioga, SP	Restinga	48%	Maia *et al.* (2008)
Carapebus and Maricá, RJ	Restinga	59.2%	Maia (2001)

cidophagous (Maia, 2020; Maia & Silva, 2021). Therefore the secondary fauna of PARNASO is little diverse in relation to taxonomic groups. All taxa reported in PARNASO as secondary fauna were already cited in other inventories in Atlantic Forest areas (Ansaloni *et al.,* 2018; Maia & Carvalho-Fernandes, 2016; Maia & Mascarenhas, 2017, 2022).

Bruggmannia acaudata, B. elongata, B. robusta, Clusiamyia nitida, Neolasioptera eugeniae, Proasphondylia guapirae, Sphaeromyia flava are recorded for the first

time in PARNASO, as well as the genera *Clinodiplosis* Kieffer, 1894; *Dasineura* Rondani, 1840 and *Neolasioptera* Felt, 1908.

CONCLUSIONS

PARNASO hosts a great richness of galls. It has the second highest recorded gall richness in the Atlantic forest. The super host taxa indicated in the present study were the same indicated in other inventories in forest formations of the Atlantic forest, except Rubiaceae. PARNASO includes 148 native gall-inducing species, being 69 endemic; among the last 23 are exclusive to the Atlantic forest. Eight gall-inducing species are endangered and four are near threathned. The gall frequency on host plant organs followed the known pattern, as well as the most frequent gall morphology and gall-inducing taxa. The secondary fauna frequency in PARNASO is high when compared to other areas of forest formation. Seven gall midge species are recorded for the first time in this Park. This study contributed to the knowledge of the gall-inducing fauna of an important protection area of Atlantic forest.

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