



## Diversity, distribution and host plants of armored scale insects (Hemiptera: Diaspididae) in Espírito Santo, Brazil

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**Abstract:** Armored scale insects (Hemiptera: Diaspididae), are phytophagous species that occur in major biogeographic regions of the world. Because of the importance of diaspidids as pests, there is widespread interest in countries that export and import unprocessed agricultural products in increased knowledge of this group which includes invasive and quarantine pests of great economic concern. The diversity, geographic distribution, and host of diaspidids were studied from November 2002 to December 2018 in 34 municipalities in the state of Espírito Santo, Brazil. Forty species of Diaspididae from 27 genera were collected and identified. The species *Acutaspis perseae* (Comstock), *A. umbonifera* (Newstead), *Aonidiella aurantii* (Maskell), *Comstockaspis pernicioso* (Comstock), *Lepidosaphes beckii* (Newman), *Lepidosaphes gloverii* (Packard), *Morganella longispina* (Morgan), *Mycetaspis apicata* (Newstead), and *Thysanoflorinia nephelii* (Maskel) were found for the first time in Espírito Santo. The plant families Myrtaceae, Moraceae, Arecaceae, Asparagaceae, and Rutaceae had the greatest number of host plant species of armored scale. Fifty-seven new host associations were observed for 25 species of diaspidids and 11 diaspidid species were recorded for the first time from nine families of plants. *Selenaspis articulatus* (Morgan) was the most polyphagous species observed with 17 host plant species from 12 families, followed by *Pseudaonidia trilobitiformis* (Green), and *Parlatoria proteus* (Curtis). With these new records, 41 species and 28 genera of Diaspididae have been recorded in Espírito Santo.  
**Keywords:** Hemiptera; Diaspidids; Quarantine; Biodiversity; Biogeography.

## Diversidade, distribuição e plantas hospedeiras de cochonilhas escama (Hemiptera: Diaspididae) no Espírito Santo, Brasil

**Resumo:** As cochonilhas escama (Hemiptera: Diaspididae), são espécies fitófagas que ocorrem nas principais regiões biogeográficas do mundo. Devido à importância dos diaspidídeos como pragas, existe um amplo interesse nos países que exportam e importam produtos agrícolas não processados no aumento do conhecimento desse grupo, o que inclui pragas invasoras e quarentenárias de grande importância econômica. A diversidade, distribuição geográfica e hospedeiros de diaspidídeos foram estudadas de novembro de 2002 a dezembro de 2018 em 34 municípios do estado do Espírito Santo, Brasil. Quarenta espécies de Diaspididae de 27 gêneros foram coletadas e identificadas. As espécies *Acutaspis perseae* (Comstock), *A. umbonifera* (Newstead), *Aonidiella aurantii* (Maskell), *Comstockaspis pernicioso* (Comstock), *Lepidosaphes beckii* (Newman), *Lepidosaphes gloverii* (Packard), *Morganella longispina* (Morgan), *Mycetaspis apicata* (Newstead) e *Thysanoflorinia nephelii* (Maskel) foram encontradas pela primeira vez no Espírito Santo. Cinquenta e sete novas associações de hospedeiros foram observadas, em um total de 25 espécies de diaspidídeos; estes incluem 13 novos registros de famílias em um total de 11 espécies de diaspidídeos e nove famílias de plantas. Myrtaceae, Moraceae e Arecaceae foram as famílias botânicas com o maior número de espécies de diaspidídeos observadas. *Selenaspis articulatus* (Morgan) foi a espécie mais polífaga, com 17 espécies de plantas hospedeiras de 12 famílias observadas, seguida por *Pseudaonidia trilobitiformis* (Green) e *Parlatoria proteus* (Curtis). Com esses novos registros, 41 espécies e 28 gêneros de Diaspididae foram registrados no Espírito Santo.  
**Palavras-chave:** Hemiptera; Diaspididae; Cochonilhas; Quarentena; Biodiversidade.

## Introduction

Among scale insects (Hemiptera: Coccoidea) the family Diaspididae has the greatest number of described species, with 2,643 species in 422 genera (García Morales et al. 2016). Members of the Diaspididae, commonly known as diaspidids or armored scale insects, occur in all major world biogeographic regions; however, the number of species of Diaspididae known in the Neotropical region is lower than in other major regions (García Morales et al. 2016). Diaspidids are phytophagous insects that feed on a great variety of plants grown for agricultural production including food, timber, and ornamentals, as well as wild, noncultivated species (Watson 2020). This group includes pests of great economic importance, including invasive and quarantine species that inhibit international commerce of agricultural products (Miller et al. 2005). Therefore, there is great interest in increased knowledge of diaspidids because of their potential impact on agriculture production and commerce worldwide as well as potential impacts on native species (Miller & Davidson 2005).

At least 163 species of Diaspididae from 53 genera have been recorded in Brazil, distributed in all regions of the country (García Morales et al. 2016). In the state of Espírito Santo, located in the Southeast region of Brazil, studies of the richness of species of diaspidids were almost nonexistent until the beginning of the decade of 2000 with only four species, *Comstockaspis perniciososa* (Comstock), *Costalimaspis eugeniae* Lepage, *Hemiberlesia lataniae* (Signoret) and *Ischnaspis longirostris* (Signoret), known to occur in the state (Silva et al. 1968, Claps et al. 1999). However, studies of insect pests, including diaspidids, and beneficial insects in agricultural crops in Espírito Santo beginning in 1999 contributed to a greater knowledge of the diversity and distribution of diaspidids and their natural enemies in the state with 29 additional diaspidid species identified in the state (Martins et al. 2004, Culik et al. 2008, 2009, 2011a, b). In addition, seven parasitoid species from the Aphelinidae and Encyrtidae (Hymenoptera: Chalcidoidea) were found associated with the diaspidid species *Aonidiella comperei* McKenzie, *Diaspis boisduvalii* Signoret, *Hemiberlesia palmae* (Cockerell), *Melanaspis smilacis* (Comstock) and *Pseudaulacaspis pentagona* (Targioni Tozzetti) in crops of papaya, peach and pineapple (Culik et al. 2011a).

Studies of the species in regions provide the basic information necessary for knowledge of biological diversity and are indispensable for improved taxonomic and biogeographic understanding. In addition, knowledge of the pest species and their host plants and natural enemies in regions is of fundamental importance for the establishment of programs of integrated pest management (IPM) necessary for sustainable production and export of agricultural products. Therefore the objective of this study was to increase knowledge of the diversity and distribution of diaspidid species and their associated host plants in Espírito Santo state, Brazil.

## Materials and Methods

Plant samples with associated diaspidids were collected in urban and rural areas of 34 of the 78 municipalities in Espírito Santo, Brazil, during the period from November 2002 to December 2018.

Sampled municipalities were located throughout the state in the regions Central Litorânea (municipalities of Alfredo Chaves, Cariacica, Guarapari, Serra, Viana, Vila Velha, and Vitória); Centro Serrana (Domingos Martins, Santa Maria de Jetibá, Santa Teresa, Vargem Alta, and Venda Nova do Imigrante); Norte (Aracruz, Boa Esperança, Colatina, Conceição da Barra, Fundão, Jaguaré, João Neiva, Linhares, Marilândia, Montanha, Pancas, Pedro Canário, Pinheiros, Rio Bananal, São Mateus, and Sooretama); and Sul (Bom Jesus do Norte, Castelo, Guaçuí, Jerônimo Monteiro, Marataízes, and Presidente Kennedy).

The diaspidid infested plant samples collected (leaves, stems, fruits, and pieces of trunk or branches) were placed in plastic bags and transported from the field to the Laboratory of Entomology of the Instituto Capixaba de Pesquisa, Assistência Técnica e Extensão Rural (Incaper), Vitória, Espírito Santo, where parts of the plant samples with attached diaspidids were stored and preserved in glass vials with 70% alcohol. For identification of species, the samples were cleared with potassium hydroxide (10%), dehydrated in 70% and 96% alcohol and mounted on glass slides in Canada balsam (Wolff et al. 2014). Identification of each species was based on morphological characteristics of the adult female, using an optical microscope and relevant identification keys (Ferris 1937, 1938, 1941, 1942, McKenzie 1937, Lepage & Gianotti 1944, Balachowsky 1954, Miller & Davidson 2005, Wolff 2008). The identifications of the species were made by second author of this publication.

A summary of collection records for each species of diaspidid that was collected in this study is provided, as well as the species previously known distribution in Brazil based on references noted, if any. New records of species of diaspidids in the state of Espírito Santo encountered in this study are noted with the expression "new state record", in parentheses, after the name of the state of Espírito Santo in the summary of the species distribution in Brazil.

New records of diaspidid host plants found in this study were determined based on previously known hosts noted by García Morales et al. (2016), and the names of the plant species follows the nomenclature of the Catalog of Life (2020). New host plant records for diaspidids species collected in this study are marked: new host plant family (\*), new host plant species (\*\*).

Voucher specimens of diaspidids identified in this study are deposited in the collections of arthropods of Incaper, Vitória, Espírito Santo and the Museu Ramiro Gomes da Costa (MRGC), Departamento de Diagnóstico e Pesquisa Agropecuária, Secretaria de Agricultura, Pecuária e Desenvolvimento Rural, Porto Alegre, Rio Grande do Sul, Brazil.

## Results

A total of 302 samples of 80 species from 36 host plant families with armored scale insects were collected in this study. Forty species of Diaspididae from 27 genera were identified, demonstrating the diversity of species of this family in the state of Espírito Santo, Brazil.

Collection records for the species of Diaspididae collected in the present study are summarized as follow:

**1. *Acutaspis perseae* (Comstock, 1881)**

Samples examined: 2

Location (municipality) records: *Serra*: -20.21167° / -40.27153°, 1 sample, 07.ix.2016, B.C. Santos coll.; *Vitória*: -20.25811° / -40.26000°, 1 sample, 11.vi.2016, B.C. Santos coll.

Host plants examined: Malpighiaceae\*: *Malpighia emarginata* [Moc. & Sesse] ex DC.\*\*; Myrtaceae\*: *Eugenia uniflora* L.\*\*

Distribution in Brazil: Espírito Santo (new state record), Rio de Janeiro, Rio Grande do Sul.

Reference: Claps et al. (2001).

**2. *Acutaspis umbonifera* (Newstead, 1920)**

Samples examined: 1

Location (municipality) records: *Vitória*: -20.31444° / -40.28947°, 1 sample, 14.iii.2016, D.S. Martins coll.

Host plants examined: Asparagaceae\*: *Yucca gigantea* Lem.\*\*

Distribution in Brazil: Espírito Santo (new state record), Rio de Janeiro, São Paulo.

Reference: Claps et al. (2001), Imenes et al. (2002).

**3. *Aonidiella aurantii* (Maskell, 1879)**

Samples examined: 1

Location (municipality) records: *Vitória*: -20.29750° / -40.29114°, 1 sample, 27.i.2016, D.S. Martins coll.

Host plants examined: Apocynaceae: *Nerium oleander* L.

Distribution in Brazil: Alagoas, Ceará, Espírito Santo (new state record), Maranhão, Pará, Paraíba, Paraná, Pernambuco, Rio de Janeiro, Rio Grande do Norte, Rio Grande do Sul, Santa Catarina, São Paulo.

Reference: Claps et al. (2001).

**4. *Aonidiella comperei* McKenzie, 1937**

Samples examined: 72

Location (municipality) records: *Aracruz*: -19.57381° / -40.19150°, 4 samples, 12.i.2006, 16.i.2006, 18.v.2006, 18.v.2006, D.S. Martins coll.; -19.54164° / -40.90964°, 1 sample, 29.vi.2006, D.S. Martins coll.; 5 samples, 05.iv.2004, 01.ix.2004, 08.v.2006, 22.v.2006, 10.x.2006, D.S. Martins coll.; *Boa Esperança*: 3 samples, 12.iii.2004, D.S. Martins coll.; *Cariacica*: 1 sample, 19.iv.2007, M.P. Culik coll.; *Jaguaré*: -18.91900° / -40.17200°, 2 samples, 09.vi.2006, D.S. Martins coll.; *Linhares*: -19.14094° / -40.16975°, 3 samples, 10.vi.2003, 12.ii.2004, 15.iii.2006, D.S. Martins coll.; -19.17067° / -40.08558°, 2 samples, 12.ii.2004, D.S. Martins coll.; -19.23431° / -40.09439°, 1 sample, 28.vi.2006, D.S. Martins coll.; -19.25189° / -40.06806°, 3 samples, 16.xii.2005, 16.v.2006, 25.vii.2006, D.S. Martins coll.; -19.27183° / -39.98478°, 2 samples, 17.v.2006, 17.vii.2006, D.S. Martins coll.; -19.29511° / -40.14889°, 7 samples, 26.ii.2004, D.S. Martins coll.; 12 samples, 12.xi.2002, 12.xi.2002, 25.ii.2003, 25.ii.2003, 26.iii.2004, 07.iv.2004, 13.iv.2004, 13.i.2006, 28.vi.2006, 17.vii.2006, 13.ix.2006, 19.ix.2006, D.S. Martins coll.; 2 samples, 15.iii.2012, M.P. Culik coll.; *Montanha*: 3 samples, 20.i.2005, 19.iv.2006, 25.iv.2006, D.S. Martins coll.; *Pedro Canário*: 1 sample, 15.ix.2004, D.S. Martins coll.; 3 samples, 28.ix.2004, D.S. Martins coll.; 4 samples, 26.x.2004, D.S. Martins coll.; *Pinheiros*: -18.41258° / -40.28750°, 1 sample, 12.iii.2004, D.S. Martins coll.; *Rio Bananal*: 1 sample, 14.iii.2006, D.S. Martins coll.; 1 sample, 11.x.2006, D.S. Martins coll.; *São Mateus*: -18.65667° / -39.94269°, 1 sample, 27.xii.2005, D.S. Martins coll.; *Sooretama*: -19.11817° / -40.08011°, 1 sample, 11.x.2006, D.S. Martins coll.; -19.15286° / -40.13519°, 1 sample, 16.vi.2006, D.S. Martins coll.; -19.16575° / -40.10956°, 1 sample, 16.vi.2006, D.S. Martins coll.; -19.16708° / -40.08961°, 1 sample, 11.i.2006, D.S. Martins coll.; -19.19222° / -40.05697°, 1 sample, 15.viii.2006, D.S. Martins coll.; 4 samples, 16.xii.2005, 10.v.2006, 12.ix.2006, 12.ix.2006, D.S. Martins coll.

Host plants examined: Caricaceae: *Carica papaya* L.; Rubiaceae: *Morinda citrifolia* L.

Distribution in Brazil: Alagoas, Bahia, Ceará, Espírito Santo, Minas Gerais, Paraíba, Pernambuco, Rio de Janeiro, Rio Grande do Norte.

Reference: Claps et al. (2001), Martins et al. (2004, 2015), Culik et al. (2008), 2011a, b).

**5. *Aspidiotus destructor* Signoret, 1869**

Samples examined: 6

Location (municipality) records: *Guarapari*: -20.73136° / -40.53331°, 1 sample, 09.iv.2016, D.S. Martins coll.; *Serra*: 1 sample, 24.iv.2006, M.P. Culik coll.; *Vitória*: -20.29703° / -40.29181°, 1 sample, 21.xii.2015, D.S. Martins coll.; 3 samples, 15.xii.2005, 19.iv.2007, 07.viii.2007, M.P. Culik coll.

Host plants examined: Arecaceae: *Cocos nucifera* L., *Dyopsis decaryi* (Jum.) Beentje & J. Dransf.\*\*; species unidentified; Clusiaceae: *Clusia* sp.\*\*.

Distribution in Brazil: Amazonas, Bahia, Ceará, Espírito Santo, Fernando de Noronha, Maranhão, Pará, Paraíba, Pernambuco, Piauí, Rio de Janeiro, Rio Grande do Norte, Santa Catarina, São Paulo, Sergipe.

Reference: Silva et al. (1968), Culik et al. (2008, 2011b).

**6. *Aspidiotus nerii* Bouche, 1833**

Samples examined: 3

Location (municipality) records: *Serra*: -20.17328° / -40.25758°, 1 sample, 12.ix.2016, B.C. Santos coll.; *Vitória*: -20.31689° / -40.32181°, 1 sample, 01.v.2004, D.S. Martins coll.; 1 sample, 29.ix.2016, B.C. Santos coll.

Host plants examined: Apocynaceae: *Nerium oleander* L.; Lauraceae: *Persea americana* Mill.; Rosaceae: *Rosa* sp.

Distribution in Brazil: Espírito Santo, Minas Gerais, Rio de Janeiro, Rio Grande do Sul, São Paulo.

Reference: Claps et al. (2001), Culik et al. (2008, 2009).

**7. *Aulacaspis tubercularis* Newstead, 1906**

Samples examined: 6

Location (municipality) records: *Bom Jesus do Norte*: -21.13153° / -41.67581°, 1 sample, 21.vii.2016, B.C. Santos coll.; *Domingos Martins*: -20.32250° / -40.81689°, 1 sample, 23.v.2006, D.S. Martins coll.; -20.37256° / -41.06356°, 1 sample, 11.iii.2012, M.P. Culik coll.; *Serra*: -20.17058° / -40.25839°, 1 sample, 07.viii.2016, B.C. Santos coll.; 1 sample, 15.xii.2003, D.S. Martins coll.; *Vitória*: 1 sample, 31.viii.2004, D.S. Martins coll.

Host plants examined: Anacardiaceae: *Mangifera indica* L.

Distribution in Brazil: Espírito Santo, Goiás, Maranhão, Minas Gerais, Rio de Janeiro, Rio Grande do Sul, São Paulo.

Reference: Claps et al. (2001), Culik et al. (2008), Ramos et al. (2018).

### 8. *Chrysomphalus aonidum* (Linnaeus, 1758)

Samples examined: 6

Location (municipality) records: *Jerônimo Monteiro*: -20.79453° / -41.37472°, 1 sample, 23.xi.2012, M.P. Culik coll.; *Serra*: -20.16889° / -40.25350°, 1 sample, 14.viii.2016, B.C. Santos coll.; *Sooretama*: -19.21700° / -40.05192°, 1 sample, 08.vii.2016, B.C. Santos coll.; *Vitória*: -20.29811° / -40.31650°, 1 sample, 26.xi.2015, D.S. Martins coll., -20.31344° / -40.30636°, 1 sample, 18.xii.2015, D.S. Martins coll.; 1 sample, 12.xii.2004, D.S. Martins coll.

Host plants examined: Asparagaceae: *Dracaena reflexa* var. *angustifolia* Baker (syn. *Dracaena marginata* Lam.); Rutaceae: *Citrus aurantium* L. (syn. *Citrus sinensis* (L.) Osbeck); Sapotaceae: *Manilkara subsericea* (Mart.) Dubard\*\*; Vitaceae: *Leea rubra* Blume\*\*.

Distribution in Brazil: Amapá, Amazonas, Bahia, Espírito Santo, Goiás, Maranhão, Mato Grosso, Minas Gerais, Pará, Paraíba, Paraná, Pernambuco, Rio de Janeiro, Rio Grande do Norte, Rio Grande do Sul, Santa Catarina, São Paulo.

Reference: Claps et al. (2001), Silva & Jordão (2005), Culik et al. (2008), Almeida et al. (2018).

### 9. *Chrysomphalus dictyospermi* (Morgan, 1889)

Samples examined: 9

Location (municipality) records: *Aracruz*: 1 sample, 17.viii.2006, D.S. Martins coll.; *Domingos Martins*: -20.37269° / -40.97608°, 1 sample, 28.xi.2015, D.S. Martins coll.; *Linhares*: -19.15189° / -40.07081°, 1 sample, 24.xi.2006, M.P. Culik coll.; *Santa Teresa*: 1 sample, 10.vii.2016, D.S. Martins coll.; *Vitória*: -20.29653° / -40.29275°, 1 sample, 24.vi.2006, D.S. Martins coll.; -20.29708° / -40.29272°, 2 samples, 16.xii.2005, D.S. Martins coll.; -20.30669° / -40.30239°, 1 sample, 20.i.2016, D.S. Martins coll.; -20.31892° / -40.30556°, 1 sample, 01.xii.2015, D.S. Martins coll.

Host plants examined: Araceae: *Zamioculcas zamiifolia* (G. Lodd.) Engl.\*\*; Arecaceae: unidentified species; Asparagaceae: *Beaucarnea recurvata* Lem.; Moraceae: *Ficus benjamina* L.; Myrtaceae: *Syzygium jambos* (L.) Alston; Rosaceae: *Rosa* sp.; Vitaceae: *Leea guineenses* G.Don\*\* (syn. *Leea coccinea* Planch), *Leea rubra* Blume\*\*.

Distribution in Brazil: Bahia, Espírito Santo, Pará, Rio de Janeiro, Rio Grande do Sul, São Paulo.

Reference: Claps et al. (2001), Culik et al. (2008).

### 10. *Comstockaspis perniciosus* (Comstock, 1881)

Samples examined: 1

Location (municipality) records: *Venda Nova do Imigrante*: 1 sample, 05.xii.2012, M.P. Culik coll.

Host plants examined: Rosaceae: *Prunus persica* (L.) Stokes.

Distribution in Brazil: Espírito Santo (new state record), Minas Gerais, Paraná, Rio de Janeiro, Rio Grande do Sul, Santa Catarina, São Paulo.

Reference: Claps et al. (2001).

### 11. *Costalimaspis eugeniae* Lepage, 1937

Samples examined: 0

Location (municipality) records: Without specific locality.

Host plants examined: not collected in the present study.

Distribution in Brazil: Espírito Santo, Rio de Janeiro, São Paulo.

Reference: Silva et al. (1968), Claps et al. (1999), Culik et al. (2008).

### 12. *Diaspidiotus ancylus* (Putnam, 1878)

Samples examined: 2

Location (municipality) records: *Vitória*: -20.27625° / -40.29872°, 1 sample, 21.viii.2016, B.C. Santos coll.; -20.29653° / -40.29275°, 1 sample, 05.ii.2006, D.S. Martins coll.

Host plants examined: Myrtaceae\*: *Psidium guajava* L.\*\*.

Distribution in Brazil: Espírito Santo, São Paulo.

Reference: Claps et al. (2001), Culik et al. (2008).

### 13. *Diaspis boisduvalii* (Signoret, 1869)

Samples examined: 9

Location (municipality) records: *Domingos Martins*: -20.37256° / -41.06356°, 2 samples, 08.iii.2006, 16.i.2008, M.P. Culik coll.; *Serra*: -19.91650° / -40.12869°, 3 samples, 15.iii.2006, M.P. Culik coll.; *Sooretama*: -19.11817° / -40.08011°, 3 samples, 24.x.2006, M.P. Culik coll.; -19.11817° / -40.08011°, 1 sample, 11.ix.2007, M.P. Culik coll.

Host plants examined: Bromeliaceae: *Ananas comosus* (L.) Merr.

Distribution in Brazil: Espírito Santo, Minas Gerais, Pará, Paraná, Piauí, Rio de Janeiro, Rio Grande do Sul, São Paulo.

Reference: Claps et al. (2001), Culik et al. (2008, 2009, 2011a).

### 14. *Diaspis bromeliae* Kerner, 1778

Samples examined: 9

Location (municipality) records: *Domingos Martins*: -20.36878° / -40.97467°, 1 sample, 26.iii.2016, D.S. Martins coll.; -20.37269° / -40.97608°, 1 sample, 03.ix.2006, D.S. Martins coll.; -20.37256° / -41.06356°, 1 sample, 22.ii.2005, M.P. Culik coll.; *Maratáizes*: 1 sample, 18.viii.2005, M.P. Culik coll.; -21.05475° / -40.86397°, 5 samples, 20.x.2005, M.P. Culik coll.

Host plants examined: Bromeliaceae: *Ananas comosus* (L.) Merr.; Myrtaceae\*: *Plinia cauliflora* (DC.) Kausel\*\*; Orchidaceae: unidentified species.

Distribution in Brazil: Bahia, Espírito Santo, Minas Gerais, Rio de Janeiro, Rio Grande do Sul, São Paulo.

Reference: Claps et al. (2001), Culik et al. (2008, 2009).

### 15. *Fiorinia fioriniae* (Targioni Tozzetti, 1867)

Samples examined: 9

Location (municipality) records: *Domingos Martins*: -20.37275° / -40.97600°, 1 sample, 28.xi.2015, D.S. Martins coll.; *Guarapari*: -20.73136° / -40.53331°, 1 sample, 24.vi.2006, D.S. Martins coll.; *Linhares*: -19.43511° / -40.08494°, 1 sample, 21.vi.2016, D.S. Martins coll.; *Serra*: -20.16889° / -40.25350°, 1 sample, 14.viii.2016, B.C. Santos coll.; -20.16994° / -40.25714°, 1 sample, 07.viii.2016, B.C. Santos coll.; -20.24503° / -40.26144°, 1 sample, 18.ix.2016, B.C. Santos coll.; *Vitória*: -20.29592° / -40.29572°, 1 sample, 01.i.2016, D.S. Martins coll.; -20.29653° / -40.29275°, 1 sample, 10.vi.2006, D.S. Martins coll.; -20.31175° / -40.30522°, 1 sample, 14.xii.2015, D.S. Martins coll.

Host plants examined: Iridaceae\*: *Diets bicolor* (Steud.) Sweet ex Klatt\*\*; Lauraceae: *Laurus nobilis* L.; Moraceae: *Artocarpus heterophyllus* Lam; Myrtaceae: *Eugenia sprengelii* DC.\*\*; Rutaceae: *Murraya paniculata* (L.) Jack.

Distribution in Brazil: Espírito Santo, Paraná, Rio de Janeiro, Rio Grande do Sul, São Paulo.

Reference: Silva et al. (1968), Culik et al. (2008).



**16. *Furcaspis biformis* (Cockerell, 1893)**

Samples examined: 4

Location (municipality) records: *Vitória*: 3 samples, 29.ix.2006, 29.ix.2006, 28.iii.2007, M.P. Culik coll.; -20.31103° / -40.30236°, 1 sample, 26.viii.2013, J.A. Ventura coll.

Host plants examined: Asparagaceae: *Agave angustifolia* Haw.\*\*; Orchidaceae: unidentified species.

Distribution in Brazil: Bahia, Espírito Santo, Rio de Janeiro, São Paulo.

Reference: Claps et al. (2001), Culik et al. (2008).

**17. *Hemiberlesia cyanophylli* (Signoret, 1869)**

Samples examined: 8

Location (municipality) records: *Conceição da Barra*: -18.56264° / -39.74250°, 1 sample, 25.xi.2015, A.F.S. Costa coll.; *Linhares*: 1 sample, 29.xi.2005, D.S. Martins coll.; *Santa Teresa*: 1 sample, 26.vii.2004, D.S. Martins coll.; *Vargem Alta*: 1 sample, 17.x.2005, M.J. Fornazier coll.; *Vitória*: -20.29653° / -40.29275°, 1 sample, 06.v.2006, D.S. Martins coll.; -20.30150° / -40.29886°, 1 sample, 01.viii.2006, D.S. Martins coll.; -20.30189° / -40.30117°, 1 sample, 19.i.2016, D.S. Martins coll.; -20.30961° / -40.28689°, 1 sample, 02.xii.2015, D.S. Martins coll.

Host plants examined: Anacardiaceae: *Anacardium occidentale* L.\*\*; Arecaceae: *Cocos nucifera* L., *Dypsis lutescens* (H. Wendl.) Beentje & J. Dransf.; Cactaceae: *Cereus hildmammianus* K. Schum; Clusiaceae\*: *Clusia fluminensis* Planch. & Triana\*\*; Moraceae: *Artocarpus altilis* (Parkinson) Fosberg.; Myrtaceae: *Plinia cauliflora* (DC.) Kausel\*\* (syn. *Myrciaria jaboticaba* (Vell.) O. Berg); Vitaceae\*: *Vitis vinifera* L.\*\*.

Distribution in Brazil: Bahia, Espírito Santo, Minas Gerais, Paraíba, Paraná, Rio de Janeiro, Rio Grande do Sul, São Paulo.

Reference: Claps et al. (2001), Culik et al. (2008).

**18. *Hemiberlesia lataniae* (Signoret, 1869)**

Samples examined: 3

Location (municipality) records: *São Mateus*: -18.73425° / -39.80231°, 1 sample, 12.v.2015, J.A. Ventura coll.; *Serra*: -20.19933° / -40.19528°, 1 sample, 06.x.2006, M.P. Culik coll.; *Venda Nova do Imigrante*: -20.41778° / -41.08486°, 1 sample, 22.xi.2011, M.P. Culik coll.

Host plants examined: Anacardiaceae: *Schinus terebinthifolia* Raddi\*\*; Meliaceae: *Azadirachta indica* A. Juss.\*\*; Vitaceae: *Vitis vinifera* L.

Distribution in Brazil: Amazonas, Espírito Santo, Minas Gerais, Pará, Rio de Janeiro, Rio Grande do Sul, São Paulo.

Reference: Silva et al. (1968), Culik et al. (2008), Almeida et al. (2018).

**19. *Hemiberlesia palmae* (Cockerell, 1893)**

Samples examined: 3

Location (municipality) records: *Domingos Martins*: 1 sample, 03.ix.2007, M.P. Culik coll.; *Fundão*: 1 sample, 27.iv.2006, M.P. Culik coll.; *Serra*: -20.17311° / -40.25742°, 1 sample, 04.iv.2016, B.C. Santos coll.

Host plants examined: Arecaceae: *Dypsis lutescens* (H. wendl.) Beentje & J. Dransf., species unidentified; Rutaceae: *Citrus reticulata* Blanco.

Distribution in Brazil: Bahia, Espírito Santo, Paraná, Rio de Janeiro, Rio Grande do Sul, São Paulo.

Reference: Silva et al. (1968), Culik et al. (2008, 2011a, b).

**20. *Howardia biclavis* (Comstock, 1883)**

Samples examined: 1

Location (municipality) records: *Vitória*: 1 sample, 26.xii.2007, M.P. Culik coll.

Host plants examined: unidentified ornamental species, leaf.

Distribution in Brazil: Bahia, Espírito Santo, Minas Gerais, Pará, Pernambuco, Rio de Janeiro, Rio Grande do Sul, Santa Catarina, São Paulo.

Reference: Claps et al. (2001), Culik et al. (2011b).

**21. *Ischnaspis longirostris* (Signoret, 1882)**

Samples examined: 13

Location (municipality) records: *Bom Jesus do Norte*: -21.13153° / -41.67581°, 1 sample, 21.vii.2016, B.C. Santos coll.; *Guarapari*: -20.67086° / -40.49914°, 1 sample, 23.i.2016, D.S. Martins coll.; *Linhares*: -19.15189° / -40.07081°, 2 samples, 24.xi.2006, 25.xi.2006, M.P. Culik coll.; *Venda Nova do Imigrante*: -20.34144° / -41.11547°, 1 sample, 24.vii.2016, D.S. Martins coll.; 1 sample, 15.iv.2005, M.P. Culik coll.; *Vitória*: -20.29708° / -40.29272°, 1 sample, 16.xii.2005, D.S. Martins coll.; -20.29914° / -40.29147°, 3 samples, 11.xii.2018, D.S. Martins coll.; -20.30592° / -40.29369°, 1 sample, 13.vi.2016, D.S. Martins coll.; -20.31175° / -40.30522°, 1 sample, 14.xii.2015, D.S. Martins coll.; 1 sample, 27.iv.2005, D.S. Martins coll.

Host plants examined: Anacardiaceae: *Mangifera indica* L.; Arecaceae: *Chamaedorea seifrizii* Burret\*\* (syn. *Chamaedorea erumpens* H.E. Moore), *Phoenix sylvestris* (L.) Roxb.\*\*; Davalliaceae\*: *Davallia fejeensis* Hook.\*\*; Iridaceae: *Diets bicolor* (Steud.) Sweet ex Klatt; Moraceae: *Ficus variegata* Bl.\*\*; Rubiaceae: *Ixora chinensis* Lam.\*\*; Sapotaceae: *Mimusops thouarsii* M.M. Hartog ex Dubard\*\*.

Distribution in Brazil: Bahia, Espírito Santo, Minas Gerais, Pará, Pernambuco, Rio de Janeiro, Rio Grande do Sul, Santa Catarina, São Paulo.

Reference: Claps et al. (2001), Culik et al. (2008).

**22. *Lepidosaphes beckii* (Newman, 1869)**

Samples examined: 1

Location (municipality) records: *Domingos Martins*: -20.36878° / -40.97467°, 1 sample, 27.iii.2016, D.S. Martins coll.

Host plants examined: Rutaceae: *Citrus aurantiifolia* (Christm.) Swingle\*\*.

Distribution in Brazil: Bahia, Espírito Santo (new state record), Goiás, Paraíba, Pernambuco, Rio de Janeiro, Rio Grande do Sul, São Paulo.

Reference: Azevedo (1923), Carvalho & Carvalho (1939), Lepage & Giannotti (1942), Wolff & Corseuil (1994a), Almeida et al. (2018).

**23. *Lepidosaphes gloverii* (Packard, 1869)**

Samples examined: 1

Location (municipality) records: *Domingos Martins*: -20.36878° / -40.97467°, 1 sample, 27.iii.2016, D.S. Martins coll.

Host plants examined: Rutaceae: *Citrus aurantiifolia* (Christm.) Swingle.

Distribution in Brazil: Espírito Santo (new state record), Rio Grande do Sul, São Paulo.

Reference: Silva et al. (1968), Wolff & Corseuil (1994a).

#### 24. *Melanaspis smilacis* (Comstock, 1883)

Samples examined: 7

Location (municipality) records: *Domingos Martins*: -20.37256° / -41.06356°, 1 sample, 25.ix.2007, M.P. Culik coll.; -20.37256° / -41.06356°, 1 sample, 16.i.2008, M.P. Culik coll.; *Sooretama*: -19.11817° / -40.08011°, 5 samples, 24.x.2006, M.P. Culik coll.

Host plants examined: Bromeliaceae: *Ananas comosus* (L.) Merr.

Distribution in Brazil: Espírito Santo, Rio de Janeiro, São Paulo.

Reference: Claps et al. (2001), Culik et al. (2008, 2009, 2011a, b), Almeida et al. (2018).

#### 25. *Morganella longispina* (Morgan, 1889)

Samples examined: 1

Location (municipality) records: *Venda Nova do Imigrante*: 1 sample, 03.ii.2012, M.P. Culik coll.

Host plants examined: Moraceae: *Ficus carica* L.

Distribution in Brazil: Espírito Santo (new state record), Paraná, Rio de Janeiro, Rio Grande do Sul, Santa Catarina, São Paulo.

Reference: Claps et al. (2001).

#### 26. *Mycetaspis apicata* (Newstead, 1920)

Samples examined: 1

Location (municipality) records: *Vitória*: -20.29914° / -40.29147°, 1 sample, 11.xii.2018, D.S. Martins coll.

Host plants examined: Arecaceae\*: *Phoenix sylvestris* (L.) Roxb.\*\*.

Distribution in Brazil: Espírito Santo (new state record), Rio de Janeiro.

Reference: Claps et al. (2001).

#### 27. *Odonaspis ruthae* Kotinsky, 1915

Samples examined: 1

Location (municipality) records: *Serra*: 1 sample, 25.xii.2005, M.P. Culik coll.

Host plants examined: Poaceae: *Cymbopogon winterianus* Jowitt ex Bor.\*\*.

Distribution in Brazil: Bahia, Espírito Santo, Rio de Janeiro.

Reference: Silva et al. (1968), Ben-Dov (1988), Culik et al. (2008).

#### 28. *Parlatoria cinerea* Hadden in Doane & Hadden, 1909

Samples examined: 4

Location (municipality) records: *Domingos Martins*: -20.38586° / -40.60733°, 1 sample, 29.iv.2016, D.S. Martins coll.; *Santa Maria de Jetibá*: 1 sample, 22.iv.2016, D.S. Martins coll.; *Santa Teresa*: -19.95956° / -40.51122°, 1 sample, 08.ii.2016, B.C. Santos coll.; *Viana*: 1 sample, 01.ix.2004, D.S. Martins coll.

Host plants examined: Rutaceae: *Citrus aurantium* L. (syn. *Citrus paradisi* Macfad, syn. *Citrus sinensis* (L.) Osbeck), *Citrus latifolia* (Tanaka ex Yu. Tanaka) Tanaka\*\*, *Citrus reticulata* Blanco.

Distribution in Brazil: Amapá, Espírito Santo, Paraíba, Rio de Janeiro, Rio Grande do Sul, São Paulo.

Reference: Silva et al. (1968), Fonseca (1965), Wolff & Corseuil (1994b), Silva & Jordão (2005), Culik et al. (2008).

#### 29. *Parlatoria pergandii* Comstock, 1881

Samples examined: 4

Location (municipality) records: *Domingos Martins*: -20.36878° / -40.97467°, 2 samples, 27.iii.2016, D.S. Martins coll.; *Serra*: -20.19844° / -40.26053°, 1 sample, 03.ix.2016, B.C. Santos coll.; *Vitória*: -20.29653° / -40.29333°, 1 sample, 19.viii.2006, D.S. Martins coll.

Host plants examined: Moraceae: *Ficus recurva* Bl.\*\*; Rutaceae: *Citrus latifolia* (Tanaka ex Yu. Tanaka) Tanaka\*\*.

Distribution in Brazil: Bahia, Espírito Santo, Rio de Janeiro, Rio Grande do Sul, São Paulo.

Reference: Silva et al. (1968), Wolff & Corseuil (1994b), Culik et al. (2008).

#### 30. *Parlatoria proteus* (Curtis, 1843)

Samples examined: 15

Location (municipality) records: *Serra*: -20.19936° / -40.27108°, 1 sample, 22.v.2016, B.C. Santos coll.; *Vitória*: -20.29336° / -40.29336°, 1 sample, 29.xi.2015, D.S. Martins coll.; -20.29622° / -40.29578°, 1 sample, 03.i.2016, D.S. Martins coll.; -20.29642° / -40.29314°, 2 samples, 06.xii.2015, D.S. Martins coll.; -20.29644° / -40.29514°, 1 sample, 06.xii.2015, D.S. Martins coll.; -20.29653° / -40.29275°, 1 sample, 21.x.2006, D.S. Martins coll.; -20.29939° / -40.29214°, 1 sample, 03.i.2016, D.S. Martins coll.; -20.31444° / -40.28947°, 1 sample, 14.iii.2016, D.S. Martins coll.; -20.31867° / -40.30536°, 1 sample, 02.vi.2016, B.C. Santos coll.; -20.31872° / -40.30539°, 1 sample, 28.vii.2006, D.S. Martins coll.; -20.29694° / -40.29261°, 1 sample, 12.xii.2004, D.S. Martins coll.; 3 samples, 30.xii.2004, 09.xii.2005, 20.v.2013, M.P. Culik coll.

Host plants examined: Araceae: *Anthurium andraeanum* Linden ex André\*\*; Araliaceae: *Schefflera arboricola* (Hayata) Merr.; Arecaceae: *Dypsis lutescens* (H. Wendl.) Beentje & J. Dransf., *Phoenix roebelenii* O'Brien\*\*; Asparagaceae: *Beaucarnea recurvata* Lem.\*\*; *Dracaena reflexa* Lam.\*\*; *Yucca gigantea* Lem.\*\*; Cycadaceae: *Cycas revoluta* Thunb.; Euphorbiaceae: *Euphorbia milii* Des Moul; Moraceae: *Ficus benjamina* L.; Rutaceae: *Murraya paniculata* (L.) Jack\*\*; Vitaceae: *Leea rubra* Blume\*\*.

Distribution in Brazil: Espírito Santo, Paraíba, Pernambuco, Rio Grande do Sul, São Paulo.

Reference: Silva et al. (1968), Corseuil & Silva (1971), Culik et al. (2008).

#### 31. *Pinnaspis aspidistrae* (Signoret, 1869)

Samples examined: 12

Location (municipality) records: *Domingos Martins*: -20.37256° / -41.06356°, 2 samples, 10.iii.2012, 19.iv.2012, M.P. Culik coll.; -20.36861° / -40.97425°, 2 samples, 18.vi.2006, 28.xi.2015, D.S. Martins coll.; -20.37269° / -40.97608°, 1 sample, 10.ix.2006, D.S. Martins coll.; -20.38586° / -40.60733°, 1 sample, 29.iv.2016, D.S. Martins coll.; -20.37256° / -41.06356°, 1 sample, 19.iv.2012, M.P. Culik coll.; *Jerônimo Monteiro*: -20.79453° / -41.37472°, 2 samples, 10.i.2012, M.P. Culik coll.; *Santa Maria de Jetibá*: 1 sample, 22.iv.2016, D.S. Martins coll.; *Serra*: -20.16889° / -40.25350°, 1 sample, 14.viii.2016, B.C. Santos coll.; *Venda Nova do Imigrante*: -20.41433° / -41.16481°, 1 sample, 23.vii.2006, D.S. Martins coll.; *Vitória*: -20.31175° / -40.30522°, 1 sample, 14.xii.2015, D.S. Martins coll.

Host plants examined: Iridaceae\*: *Dietes bicolor* (Steud.) Sweet ex Klatt\*\*; Rutaceae: *Citrus aurantium* L. (syn. *Citrus sinensis* (L.) Osbeck), *Citrus reticulata* Blanco.

Distribution in Brazil: Amapá, Amazonas, Bahia, Espírito Santo, Goiás, Maranhão, Minas Gerais, Pará, Paraíba, Paraná, Rio de Janeiro, Rio Grande do Sul, Santa Catarina, São Paulo.

Reference: Claps et al. (2001), Silva & Jordão (2005), Culik et al. (2008), Almeida et al. (2018).

**32. *Pinnaspis buxi* (Bouché, 1851)**

Samples examined: 5

Location (municipality) records: *Marataízes*: 1 sample, 20.x.2005, M.P. Culik coll.; *Vitória*: -20.29708° / -40.29272°, 1 sample, 16.xii.2005, D.S. Martins coll.; -20.31825° / -40.32397°, 1 sample, 22.iii.2016, D.S. Martins coll.; 2 samples, 12.xii.2004, 27.iv.2005, D.S. Martins coll.

Host plants examined: Araceae: *Spathiphyllum wallisii* Regel\*\*; Asparagaceae: *Cordyline fruticosa* (L.) A. Chev. (syn. *Cordyline terminalis* L. Kunth.); Iridaceae: *Dietes bicolor* (Steud.) Sweet ex Klatt; Malvaceae: *Sida* sp.

Distribution in Brazil: Bahia, Espírito Santo, Rio de Janeiro, São Paulo.

Reference: Claps et al. (2001), Culik et al. (2008).

**33. *Pinnaspis strachani* (Cooley, 1899)**

Samples examined: 8

Location (municipality) records: *Domingos Martins*: -20.36711° -40.97269°, 2 samples, 03.ix.2006, D.S. Martins coll.; *Linhares*: -19.15189° / -40.07081°, 1 sample, 25.xi.2006, M.P. Culik coll.; *Santa Teresa*: -19.95956° / -40.51122°, 1 sample, 07.ii.2016, B.C. Santos coll.; *Sooretama*: 1 sample, 16.v.2006, D.S. Martins coll.; *Vitória*: -20.29497° / -40.28650°, 1 sample, 30.iii.2015, D.S. Martins coll.; 2 samples, 15.iv.2005, 24.xii.2005, M.P. Culik coll.

Host plants examined: Anacardiaceae: *Mangifera indica* Bl.; Areaceae: *Chamaedorea seifrizii* Burret (syn. *Chamaedorea erumpens* H.E. Moore); Malvaceae: *Hibiscus mutabilis* L., *Hibiscus rosa-sinensis* L.; Moraceae: *Artocarpus heterophyllus* Lam.; Poaceae: unidentified weed species; Rutaceae: *Citrus aurantium* L. (syn. *Citrus paradisi* Macfadyen, syn. *Citrus sinensis* (L.) Osbeck).

Distribution in Brazil: Amazonas, Bahia, Espírito Santo, Pernambuco, Rio Grande do Sul, São Paulo.

Reference: Carvalho & Carvalho (1939), Foldi (1988), Imenes et al. (2000), Wolff & Corseuil (1994a), Culik et al. (2008, 2009), Castro et al. (2020b).

**34. *Pseudonidia trilobitiformis* (Green, 1896)**

Samples examined: 25

Location (municipality) records: *Castelo*: 1 sample, 09.x.2006, R.G. Ferrão coll.; *Colatina*: -19.50719° / -40.55392°, 1 sample, 07.i.2016, I. Monnerat coll.; *Conceição da Barra*: -18.56264° / -39.74250°, 1 sample, 25.xi.2015, A.F.S. Costa coll.; *Guarapari*: -20.67078° / -40.50161°, 1 sample, 12.i.2016, D.S. Martins coll.; -20.67083° / -40.49656°, 1 sample, 10.iv.2016, D.S. Martins coll.; -20.67292° / -40.49936°, 1 sample, 12.i.2016, D.S. Martins coll.; -20.73136° / -40.53331°, 1 sample, 24.vi.2006, D.S. Martins coll.; *Linhares*: -19.41708° / -40.07936°, 1 sample, 08.vii.2016, B.C. Santos coll.; -19.64586° / -39.82447°, 1 sample, 18.vi.2016, B.C. Santos coll.; 1 sample, 10.v.2006, D.S. Martins coll.; *Marilândia*: -19.43386° / -40.63300°, 1 sample, 07.i.2016, I. Monnerat coll.; *Pancas*: -19.22381° / -40.84339°, 1 sample, 23.xii.2015, M.J. Fornazier coll.; *Santa Teresa*: 1 sample, 07.vii.16, B.C. Santos coll.; *Sooretama*: -19.21700° / -40.05192°, 1 sample, 08.vii.2016, B.C. Santos coll.; *Vitória*: -20.27708° / -40.29886°, 1 sample, 21.viii.2016, B.C. Santos coll.; -20.28808° / -40.29358°, 1 sample, 10.vi.2006, D.S. Martins coll.; -20.29642° / -40.29314°, 1 sample, 06.xii.2015, D.S. Martins coll.; -20.29653° / -40.29275°, 1 sample, 10.vi.2006, D.S. Martins coll.; -20.29708° / -40.29272°,

1 sample, 24.xi.2015, D.S. Martins coll.; -20.29750° / -40.29114°, 1 sample, 27.i.2016, D.S. Martins coll.; -20.30711° / -40.32128°, 1 sample, 06.xii.2015, D.S. Martins coll.; -20.30711° / -40.32128°, 1 sample, 05.ii.2016, B.C. Santos coll.; -20.31175° / -40.30522°, 1 sample, 14.xii.2015, D.S. Martins coll.; -20.31867° / -40.30536°, 1 sample, 02.vi.2016, B.C. Santos coll.; 1 sample, 19.xii.2004, D.S. Martins coll.

Host plants examined: Anacardiaceae: *Anacardium occidentale* L.; Apocynaceae: *Nerium oleander* L.; Iridaceae\*: *Dietes bicolor* (Steud.) Sweet ex Klatt\*\*; Lauraceae: *Laurus nobilis* L.; Lythraceae: *Punica granatum* L.; Moraceae: *Ficus pumila* L.; Myrtaceae: *Psidium cattleianum* Afzel. ex Sabine, *Psidium guajava* L.; Oleaceae: *Olea europaea* L.; Rubiaceae: *Coffea canephora* Pierre ex A. Froehner\*\*, *Ixora chinensis* Lam.\*\*; Rutaceae: *Murraya paniculata* (L.) Jacq.

Distribution in Brazil: Bahia, Ceará, Espírito Santo, Minas Gerais, Pará, Paraíba, Pernambuco, Rio de Janeiro, Rio Grande do Norte, Rio Grande do Sul, São Paulo.

Reference: Claps et al. (2001), Culik et al. (2008, 2009).

**35. *Pseudaulacaspis pentagona* (Targioni Tozzetti, 1886)**

Samples examined: 7

Location (municipality) records: *Domingos Martins*: -20.37256° / -41.06356°, 3 samples, 16.i.2008, 14.xi.2011, 14.xi.2011, M.P. Culik coll.; -20.37269° / -40.97608°, 1 sample, 29.xi.2015, D.S. Martins coll.; *Linhares*: 1 sample, 19.v.2006, D.S. Martins coll.; *Sooretama*: -19.21700° / -40.05192°, 1 sample, 08.vii.2016, B.C. Santos coll.; 1 sample, 10.v.2006, D.S. Martins coll.

Host plants examined: Cannabaceae: *Trema micrantha* (L.) Bl.; Didiereaceae\*: *Portulacaria afra* Jacq.\*\*; Passifloraceae: *Passiflora edulis* Sims; Rosaceae: *Prunus persica* (L.) Stokes.

Distribution in Brazil: Bahia, Ceará, Distrito Federal (Brasília), Espírito Santo, Maranhão, Minas Gerais, Pará, Paraíba, Paraná, Pernambuco, Rio de Janeiro, Rio Grande do Norte, Rio Grande do Sul, Santa Catarina, São Paulo.

Reference: Silva et al. (1968), Culik et al. (2008, 2011a, b), Castro et al. (2020a).

**36. *Pseudischnaspis bowreyi* (Cockerell, 1893)**

Samples examined: 2

Location (municipality) records: *Linhares*: -19.15189° / -40.07081°, 1 sample, 25.xi.2006, M.P. Culik coll.; *Serra*: -20.16889° / -40.25350°, 1 sample, 14.viii.2016, B.C. Santos coll.

Host plants examined: Myrtaceae: *Eugenia stipitata* Mc Vaughn\*\*.

Distribution in Brazil: Espírito Santo, Paraíba, São Paulo.

Reference: Hempel (1900), Silva et al. (1968), Culik et al. (2008).

**37. *Pseudoparlatoria argentata* Hempel, 1912**

Samples examined: 1

Location (municipality) records: *Guarapari*: -20.73136° / -40.53331°, 1 sample, 24.vi.2006, D.S. Martins coll.

Host plants examined: unidentified parasitic species (Santalales)

Distribution in Brazil: Bahia, Distrito Federal (Brasília), Espírito Santo, Mato Grosso, Minas Gerais, Paraná, Rio de Janeiro, Rio Grande do Sul, São Paulo.

Reference: Claps et al. (1999), Wolff (2008), Culik et al. (2008), Castro et al. (2020c).



### 38. *Pseudoparlatoria parlatorioides* (Comstock, 1883)

Samples examined: 2

Location (municipality) records: *Alfredo Chaves*: 1 sample, 06.vii.2004, D.S. Martins coll.; *Vila Velha*: 1 sample, 28.v.2012, M.P. Culik coll.

Host plants examined: Myrtaceae: *Plinia cauliflora* (DC.) Kausel (syn. *Myrciaria jaboticaba* (Vell.) O. Berg, *Psidium guajava* L.

Distribution in Brazil: Espírito Santo, Minas Gerais, Rio de Janeiro, Rio Grande do Sul, São Paulo.

Reference: Wolff (2008), Culik et al. (2008).

### 39. *Selenaspis articulatus* (Morgan, 1889)

Samples examined: 25

Location (municipality) records: *Aracruz*: 1 sample, 18.xii.2005, D.S. Martins coll.; *Domingos Martins*: -20.36878° / -40.97467°, 1 sample, 24.iv.2005, D.S. Martins coll.; *Guaçu*: 2 samples, 12.i.2006, 07.iii.2006, H. Costa coll.; *João Neiva*: 1 sample, 01.vi.2004, D.S. Martins coll.; *Linhares*: -19.15189° / -40.07081°, 5 samples, 25.xi.2006, M.P. Culik coll.; -19.41708° / -40.07936°, 1 sample, 08.vii.2016, B.C. Santos coll.; *Presidente Kennedy*: -21.27861° / -40.96400°, 1 sample, 16.iv.2017, B.C. Santos coll.; -21.27861° / -40.96400°, 2 samples, 22.xii.2016, 14.iv.2017, B.C. Santos coll.; *Santa Teresa*: -19.95956° / -40.51122°, 2 samples, 08.ii.2016, 09.ii.2016, B.C. Santos coll.; 1 sample, 07.vii.2016, B.C. Santos coll.; *Serra*: -20.16889° / -40.25350°, 1 sample, 14.viii.2016, B.C. Santos coll.; -20.17311° / -40.25742°, 1 sample, 07.iv.2016, B.C. Santos coll.; -20.21047° / -40.27297°, 1 sample, 07.ix.2016, B.C. Santos coll.; -20.21167° / -40.27153°, 3 samples, 07.ix.2016, B.C. Santos coll.; -20.24503° / -40.26144°, 1 sample, 18.ix.2016, B.C. Santos coll.; *Vitória*: -20.25233° / -40.27319°, 1 sample, 11.vii.2016, B.C. Santos coll.

Host plants examined: Annonaceae: *Annona atemoya* Mabb.\*\*; Apocynaceae: *Tabernaemontana divaricata* (L.) R.Br. ex Roem. & Schult.\*\* (syn. *Ervatamia coronaria* (Jacq.) Stapf); Arecaceae: *Cocos nucifera* L., *Dypsis lutescens* (H. Wendl.) Beentje & J. Dransf.; Malpighiaceae: *Malpighia emarginata* [Moc. & Sesse] ex DC.\*\*; Malvaceae: *Theobroma cacao* L.\*\*; Myrtaceae: *Eugenia uniflora* L.\*\*; Oleaceae: *Ligustrum* sp.\*\*; *Olea europaea* L.; Oxalidaceae: *Averrhoa carambola* L.; Passifloraceae: *Passiflora edulis* Sims; Rutaceae: *Citrus aurantiifolia* (Christm.) Swingle (syn. *Citrus limettioides* Tanaka), *Citrus aurantium* L. (syn. *Citrus sinensis* (L.) Osbeck), *Citrus latifolia* (Tanaka ex Yu. Tanaka) Tanaka\*\*, *Citrus reticulata* Blanco; Sapotaceae: *Labramia bojeri* A. DC.\*\*; Solanaceae: *Brunfelsia uniflora* (Pohl) D.Don\*\*.

Distribution in Brazil: Amapá, Amazonas, Bahia, Espírito Santo, Goiás, Pará, Rio de Janeiro, Rio Grande do Norte, São Paulo.

Reference: Perruso & Cassino (1993), Claps et al. (2001), Martins et al. (2004, 2015), Silva & Jordão (2005), Culik et al. (2008), Silva et al. (2020).

### 40. *Thysanoflorinia nephelii* (Maskell, 1897)

Samples examined: 2

Location (municipality) records: *Domingos Martins*: -20.37256° / -41.06356°, 1 sample, 27.i.2012, M.P. Culik coll.; *Venda Nova do Imigrante*: -20.33964° / -41.11533°, 1 sample, 10.xi.2011, M.P. Culik coll.

Host plants examined: Sapindaceae: *Litchi chinensis* Sonner.

Distribution in Brazil: Espírito Santo (new state record), Rio de Janeiro.

Reference: Claps et al. (2001).

### 41. *Unaspis citri* (Comstock, 1883)

Samples examined: 10

Location (municipality) records: *Domingos Martins*: -20.36861° / -40.97425°, 3 samples, 27.iii.2016, 27.iii.2016, 28.xi.2015, D.S. Martins coll.; -20.37256° / -41.06356°, 1 sample, 11.iii.2012, M.P. Culik coll.; 1 sample, 23.viii.2007, M.P. Culik coll.; *Fundão*: 2 samples, 27.iv.2006, M.P. Culik coll.; *Linhares*: -19.15189° / -40.07081°, 1 sample, 25.xi.2006, M.P. Culik coll.; *Santa Maria de Jetibá*: 1 sample, 22.iv.2016, D.S. Martins coll.; *Santa Teresa*: -19.95956° / -40.51122°, 1 sample, 09.ii.2016, B.C. Santos coll.

Host plants examined: Rutaceae: *Citrus aurantium* L. (syn. *Citrus sinensis* (L.) Osbeck), *Citrus latifolia* (Tanaka ex Yu. Tanaka) Tanaka\*\*, *Citrus reticulata* Blanco.

Distribution in Brazil: Alagoas, Espírito Santo, Mato Grosso, Rio de Janeiro, Rio Grande do Sul, São Paulo.

Reference: Claps et al. (2001), Culik et al. (2008, 2009, 2011b), Ferreira et al. (2013).

## Discussion

*Acutaspis perseae* (Comstock), *Acutaspis umbonifera* (Newstead), *Aonidiella aurantii* (Maskell), *Comstockaspis perniciosus* (Comstock), *Lepidosaphes beckii* (Newman), *Lepidosaphes gloverii* (Packard), *Morganella longispina* (Morgan), *Mycetaspis apicata* (Newstead) and *Thysanoflorinia nephelii* (Maskell) were recorded for the first time in the state. *Costalimaspis eugeniae* (Silva et al. 1968, Claps et al. 1999) was the only species of diaspidid not observed in the present study that has previously been noted in Espírito Santo.

Fifty-seven new host associations were observed, across a total of 25 species of diaspidids; these include 13 new family records across a total of 11 diaspidid species and 9 plant families: *A. perseae* on Malpighiaceae (*Malpighia emarginata* [Moc. & Sesse] ex DC.) and Myrtaceae (*Eugenia uniflora* L.); *A. umbonifera* on Asparagaceae (*Yucca gigantea* Lem.); *Diaspidiotus ancylus* (Putnam) on Myrtaceae (*Psidium guajava* L.); *Diaspis bromeliae* (Kerner) on Myrtaceae (*Plinia cauliflora* (DC.) Kausel); *Fiorinia fioriniae* (Targioni Tozzetti) on Iridaceae (*Diets bicolor* (Steud.) Sweet ex Klatt); *Hemiberlesia cyanophylli* (Signoret) on Clusiaceae (*Clusia fluminensis* Planch. & Triana) and Vitaceae (*Vitis vinifera* L.); *I. longirostris* on Davalliaceae (*Davallia fejeensis* Hook.); *M. apicata* on Arecaceae (*Phoenix sylvestris* (L.) Roxb.); *Pinnaspis aspidistrae* (Signoret) and *Pseudonidia trilobitiformis* (Green) on Iridaceae (*Diets bicolor* (Steud.) Sweet ex Klatt); and *P. pentagona* on Didiereaceae (*Portulacaria afra* Jacq.).

The plant families Myrtaceae, Moraceae, Arecaceae, Asparagaceae, and Rutaceae had the greatest number of host plant species of diaspidids collected in the present study. However, worldwide the plant families with the greatest number of associated diaspidid species are Fabaceae, Poaceae, Euphorbiaceae, Myrtaceae, Rosaceae, Moraceae, Oleaceae, Arecaceae, and Rutaceae (García Morales et al. 2016). The diaspidid *Selenaspis articulatus* (Morgan) was observed to be the most polyphagous species and was associated with 17 host plant species of 12 families in the present study, followed by *P. trilobitiformis* (associated with 13 plant species of 9 families), and *Parlatoria proteus* (associated with 12 plant species of 9 families). In a study of diaspidids in tropical forests (Rainforest) of Panama (Central America) *S. articulatus* was also the most polyphagous species. (Normark et al., 2014; Peterson et al., 2020).



Some species of diaspidids stand out in Espírito Santo because of the damage that they cause to agricultural crops of great socioeconomic importance in the state. *Aonidiella comperei* is the most important diaspidid pest in Espírito Santo because of the great damage it causes to papaya, the principal fruit of exportation of the state (Ibge 2020, Agrostar 2020). This species is widespread and common in the main papaya producing regions of Brazil, causing damage to the trunks and fruits of papaya, and because of its rapid multiplication and spread in fields, it has been the most important scale insect pest of papaya in Brazil (Martins et al. 2015); *D. boisduvalii*, *D. bromeliae*, and *M. smilacis* are important pests in the culture of pineapple (Culik et al. 2009); *P. trilobitiformis* is associated with conilon coffee (*Coffea canephora*) (Silva et al. 2019); *C. pernicioso* and *P. pentagona* infest the peach crop in the Serrana Region of Espírito Santo (Fornazier et al. 1987). In the present study diaspidids were also found in many other crops of economic importance in Espírito Santo state including acerola, cacao, citrus (lemon, orange, and tangerine), coconut, guava, lichee, mango, passionfruit, and grape.

With the nine new records of diaspidids observed in the present study, 41 species are now recorded in this Espírito Santo state, Brazil which is slightly more than 25% of the 163 species which have been recorded in this country (García Morales et al. 2016).

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## Associate Editor

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## Authors Contributions

David dos Santos Martins: contribution in the concept and design of the study; contribution to data collection; contribution to data analysis and interpretation; contribution to manuscript preparation; contribution to critical revision.

Vera Regina dos Santos Wolff: contribution to data collection; contribution to data analysis and interpretation; contribution to manuscript preparation; contribution to critical revision.

Mark Paul Culik: contribution to data collection; contribution to data analysis and interpretation; contribution to manuscript preparation; contribution to critical revision.

Beatriz Crisostomo dos Santos: contribution to data collection, contribution to data analysis and interpretation, and contribution to manuscript preparation.

Maurício José Fornazier: contribution to data collection, contribution to data analysis and interpretation, and contribution to manuscript preparation.

José Aires Ventura: contribution to data collection; contribution to data analysis and interpretation; contribution to manuscript preparation; contribution to critical revision.

## Conflicts of Interest

The authors declare that they have no conflict of interest related to the publication of this manuscript, and the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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