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THE LICHENS OF DAGNY JOHNSON KEY LARGO HAMMOCK BOTANICAL STATE PARK, KEY LARGO, FLORIDA, USA

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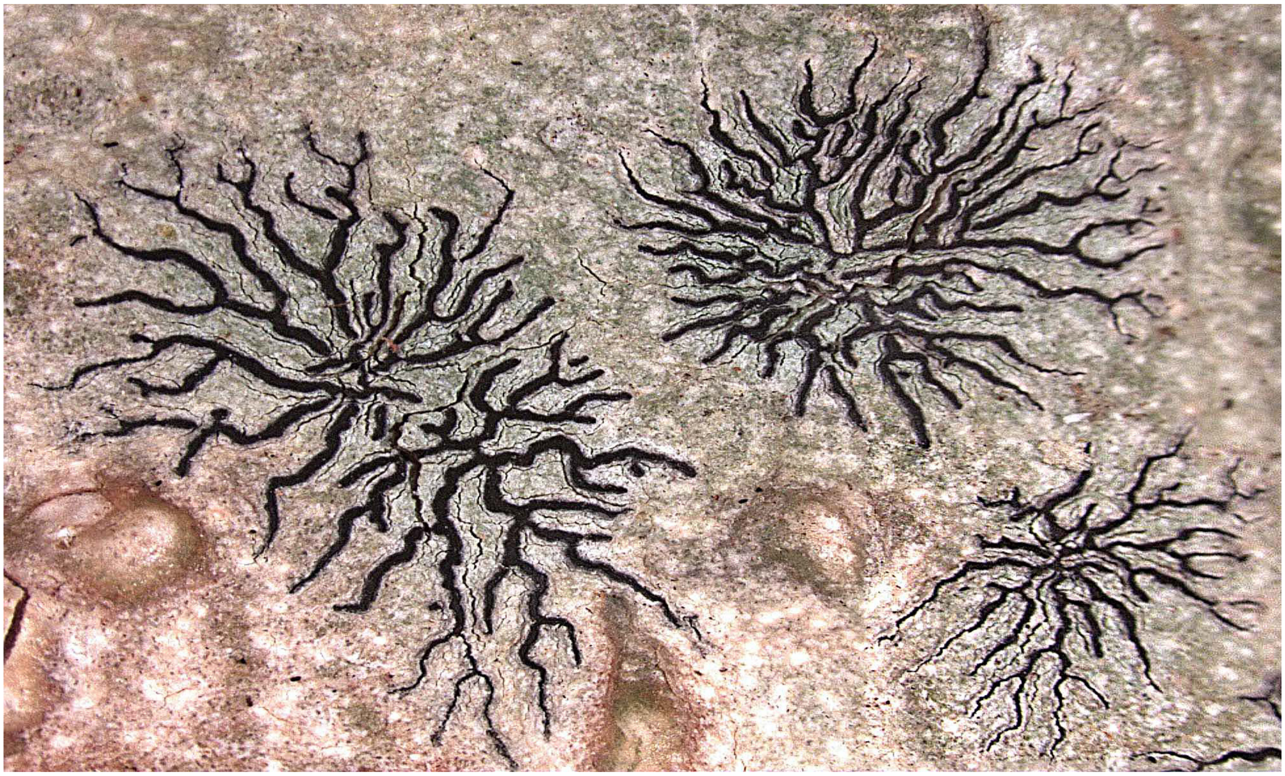

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Cover image: *Phaeographis radiata* sp. nov.; image taken by Jean Seavey (see p. 230)

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THE LICHENS OF DAGNY JOHNSON KEY LARGO HAMMOCK BOTANICAL STATE PARK, KEY LARGO, FLORIDA, USA

Frederick Seavey[1], Jean Seavey[1], Jean Gagnon[2], John Guccion[3], Barry Kaminsky[4], John Pearson[5], Amy Podaril[6], and Bruce Randall[7]

ABSTRACT

In January, 2015, we conducted a lichen inventory of Dagny Johnson Key Largo Hammock Botanical State Park in Key Largo, Florida. The site was divided into four ecologically different zones which included two coastal hardwood hammocks of different maturities, a disturbed exposed site once probably dominated by pines long extirpated and a fully exposed dwarf mangrove zone interspersed with other non-mangrove species. The mature coastal hammock yielded 172 species dominated by the family Graphidaceae, especially the subfamily Fissurinoideae and the tribe Thelotremateae. The most exposed mangrove site produced only 73 species dominated by the families Arthoniaceae, Physciaceae and Lecanoraceae. The park is also compared to two nearby South Florida preserves, Everglades National Park and Fakahatchee Strand Preserve State Park both of which have had recent lichen inventories. A surprisingly high number of species were found to be unique to each preserve suggesting at least some lichens have difficulty in dispersing themselves sexually or asexually over even moderate distances. Foray participants recovered 323 species including 315 lichenized and 8 lichenicolous fungi. Eighteen lichen species and one lichenicolous fungi are described as new to science: *Acanthothecis floridensis* F. Seavey and J. Seavey sp. nov. *Arthonia pseudostromatica* F. Seavey and J. Seavey sp. nov., *Coenogonium maritimum* F. Seavey and J. Seavey sp. nov., *Cryptothecia calusarum* F. Seavey and J. Seavey sp. nov., *Cryptothecia randallii* F. Seavey and J. Seavey sp. nov., *Cryptothecia submacrocephala* F. Seavey and J. Seavey sp. nov., *Enterographa johnsoniae* F. Seavey and J. Seavey sp. nov., *Enterographa keylargoensis* F. Seavey and J. Seavey sp. nov., *Fissurina albolabiata* F. Seavey and J. Seavey sp. nov., *Fissurina incisura* F. Seavey and J. Seavey sp. nov., *Graphis ferrugineodisca* F. Seavey and J. Seavey sp. nov., *Graphis koltermaniae* F. Seavey and J. Seavey sp. nov., *Leiorreuma erodens* F. Seavey and J. Seavey sp. nov., *Phaeographis pseudostromatica* F. Seavey and J. Seavey sp. nov., *Phaeographis radiata* F. Seavey and J. Seavey sp. nov., *Platygramme elegantula* F. Seavey and J. Seavey sp. nov., *Ramalina ramificans* F. Seavey and J. Seavey sp. nov., *Stirtonia divaricatica* F. Seavey and J. Seavey sp. nov. The lichenicolous fungus *Enterographa bagliettoae* F. Seavey and J. Seavey sp. nov. is also described as new to science. Furthermore, the following 25 lichens are new to the North American lichen checklist: *Arthonia microsperma* Nyl., *Arthonia hypochniza* Nyl., *Bacidiopsora orizabana* (Vain.) Kalb, *Baculifera micromera* (Vain.) Marbach, *Chapsa boninensis* (Tat. Matsumoto) Rivas Plata and Mangold, *Chapsa paralbida* (Riddle) Rivas Plata and Lücking, *Chapsa phlyctidioides* (Müll. Arg.) Mangold, *Coenogonium pyrophthalmum* (Mont.) Lücking, Aptroot and Sipman, *Graphis bungartzii* Barcenas-Peña, Lücking, Herrera-Campos and R. Miranda, *Graphis elongata* Zenker, *Graphis perstriatula* Nyl., *Graphis pseudoserpens* Chaves, Lücking and Umaña, *Leucodecton compunctum* (Ach.)

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A. Massal., *Leucodecton fissurinum* (Hale) A. Frisch, *Malmidea cineracea* Bruess and Lücking, *Mazosia viridescens* (Fèe) Aptroot and M. Cáceres, *Monoblastia palmicola* Riddle, *Mycomicrothelia apposita* (Nyl.) D. Hawksw., *Pertusaia rigida* Müll. Arg., *Pertusaria subrigida* Müll. Arg., *Phaeographis dividens* (Nyl.) Kr. P. Singh and Swarnalatha, *Phaeographis quadrifera* (Nyl.) Staiger, *Phyllopsora glaucescens* (Nyl.) Gotth. Schneider, *Stigmatochroma gerontoides* (Stirton) Marbach, *Stirtonia alba* Makhija and Patw., as well as the lichenicolous fungus *Arthonia tavaresii* Grube and Hafellner. The following keys are provided: updated key to Florida *Graphis*; North American key to *Phaeographis;* corrected Neotropical key to *Stirtonia*, and a world key to *Platygramme*. In the updated *Graphis* key *Graphis chlorotica* A. Massal. is replaced by *G. subtenella* Müll. Arg. based upon a review of *G. chlorotica* type material in a recently published manuscript. Therefore, we recommend replacing *G. chlorotica* with *G. subtenella* on the North American lichen checklist.

Key words: new species; Key Largo, Florida; Dagny Johnson; lichen inventory; lichen identification; lichen photos; biodiversity.

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INTRODUCTION

It has been only in recent times that the richness of lichen flora in tropical and subtropical latitudes has been recognized (Cáceres et al., 2008, 2014; Lücking et al., 2011; Seavey and Seavey, 2012, 2014b; Rivas Plata and Lücking, 2013; Seavey et al., 2014). This is particularly true for epiphytic crustose microlichens, such as those within the families Graphidaceae and Arthoniaceae, which are more numerous at lower latitudes than elsewhere (Frisch and Thor, 2010; Rivas Plata and Lücking, 2013; Lücking et al., 2014; Ertz el al., 2015). Climatic factors are probably the main impetus for this phenomenon as these parts of the world lack harsh winter conditions and provide a more ideal photsynthesis/respiration environment. In general, lichen awareness in the United States has greatly increased during the last twenty years as evidenced by numerous publications, some more general in nature (Brodo et al., 2001). Excellent works have provided global or regional keys to various tropical and subtropical lichen genera (Harris, 1995; Marbach, 2000; Staiger, 2002; Sparrius, 2004; Frisch, 2006; Frisch and Kalb, 2006; Rivas Plata et al., 2006, 2010; Cáceres, 2007; Aptroot, 2009; Lücking et al., 2009; Seavey and Seavey, 2011b, 2014a, 2015; Lendemer and Harris, 2014; Seavey et al. 2014). Although the economic importance of lichens has long been exploited (Richardson, 1988; Coppins and Watling, 1994; Elix and Stocker-Wörgötter, 2008) and their potential use as air monitoring stalwarts is well known (Bennet, 2002; Chakrabortty and Paratkar, 2006; Cayir et al., 2007), it is only recently that their importance to, and function in the natural world is being recognized and explored (Rivas Plata et al., 2008; Seavey and Seavey, 2014b).

Florida is well known for its overdevelopment, but its extreme southern tip has been largely preserved by the aggregate establishment of over ten national and state parks and preserves, as well as state recreation areas, county parks, and national wildlife refuges. Many such areas throughout the United States have generated lichen checklists (Tucker, 1979; Nash et al., 2007; Hanson and Lendemer, 2008; Lücking et al., 2011; Lendemer et al., 2013; Perlmutter, 2013). However, until 2011 no such published inventory for any of the south Florida preserved sites existed. The 18th Tuckerman workshop in 2009, organized by the Eastern Lichen Network, conducted an inventory at Fakahatchee Strand Preserve State Park (FSP) in Copeland, Florida, not far from the site of this current inventory. The results were dramatic in that 432 species were discovered, exceeding the most optimistic predictions, 18 of which were previously unknown to science. Many others were new records for the continent (Lücking et al., 2011).

Also during this time frame, researchers at the nearby Everglades National Park (ENP) were constructing their own lichen checklist which now stands at 569 (Seavey and Seavey, unpub. data), again with many new to science or North America (Seavey, 2009, 2010; Seavey and Seavey, 2011a, 2011b, 2012, 2014a, 2014b, 2015; Seavey et al. 2014). The large number of lichen species new to science or North America at the above two inventories suggested additional nearby areas should be explored. To that end members of The American Bryological and Lichenological Society (ABLS) (Fig. 1) conducted a lichen inventory of Dagny Johnson Key Largo Hammock Botanical State Park (Dagny) in Key Largo, Florida. This site was chosen because it differs somewhat from both Everglades National Park and Fakahatchee Strand Preserve State Park in many aspects including vegetation, geography, substrate, and weather although all three sites are not far apart. The addition of a lichen inventory at this location provides an opportunity to compare the lichen flora of each to determine what affect, if any, weather, botanical composition, and other varying conditions have on them.

METHODS AND MATERIALS

Study Area

Prior to the coming of the railroad in 1912 and the Florida land boom later that decade, much of the Florida Keys was covered by a more or less continuous mature hardwood forest composed predominantly of Caribbean species. Today most of these forests have given way to development of one kind or another. However, in northern Key Largo an approximate 2000 hectare (5000 acre) forest, despite an uncertain and tenuous history, is slowly regenerating under the management of the Florida Division of Recreation and Parks, Florida Environmental Protection Agency and the United States Fish and Wildlife Service. It is the largest West Indian tropical hardwood forest in the United States (White, 2004). The acreage is bisected more or less north to south by State Route 905. The westerly portion is protected as the Crocodile Lake National Wildlife Refuge and the eastern as Dagny Johnson Key Largo Hammock Botanical State Park (hereafter referred to as Dagny).

Dagny is located at the north end of Key Largo southeast of the southern tip of mainland Florida in Monroe County (Fig. 2). Although Key Largo lies about 2° north of the Tropic of Cancer its weather is essentially tropical with the coldest month of January having mean low and

Figure 1. Participants in the Dagny Johnson Key Largo Hammock Botanical State Park lichen foray. Front row left to right: Jean Seavey, Bruce Randall, Amy Podaril, Rick Seavey. Second Row left to right: John Pearson, John Guccion, Susi Weston, Janice Duquesnel, Susan Kolterman, Jean Gagnon. Standing tall in back: Barry Kaminsky. Missing: Trudy Ferraro, Jackie DeGayner, Mary Baker and Bunny Bradov.

high temperatures of 17 and 24° C (63 and 75° F), respectively. Average rainfall per annum is about 117 cm. (46 inches) (NOAA, 2016). Reflecting its tropical influence, the rockland forests of the Key are comprised mostly of species common to the West Indies, some of which venture no farther north (Tomlinson, 1980). These grow on a bedrock of coral limestone which may be exposed at the surface or, at two of the collection sites, with a thin veneer of organic soil generated by leaf litter. Solution holes are common throughout the park. A third site has a soil base of marl overlain by the same veneer as above. Except for manmade aggregations of fill, maximum elevation in the park is slightly under four meters (White, 2004). In addition to its different arboreal composition, the park possesses a flora and fauna unlike the rest of the continental United States. It is home to 84 protected species, many endangered and threatened (Gann, 2016). These are well inventoried and monitored, but there is no record of a systematic lichen inventory having been undertaken, although almost certainly some scattered collections from the area have been made over time. At a minimum, a lichen flora at Dagny when added to those at ENP and FSP might serve to augment our knowledge and understanding of how lichen dynamics, either passive or proactive, are affected by the successional progression of natural areas.

Spanning about 1000 hectares, Dagny has been the subject of anthropogenic and natural alteration throughout its existence. Periodic hurricanes are regular visitors to South Florida and the Keys. These may cause considerable damage to forests ranging from leaf loss to snap-offs or tip-ups, but complete mortality is uncommon and recovery is surprisingly rapid. However, for over a half century during the middle 1900s anthropogenic

Figure 2. Southern part of Florida showing location of the Dagny site at Key Largo in relation to Everglades National Park and Fakahatchee Strand Preserve State Park. Map provided by Caryl Alarcon.

alteration has been far more destructive within today's park boundaries (Wilkinson, 2010). During the 1940s many hectares were cleared by oil exploration companies. In the 1960s a surface-to-air Nike Hercules missile base was constructed within the park's boundaries in response to the Cuban Missile Crisis of 1962 (Hach, 2004). More than 10 hectares were clear-cut, radar towers installed, and numerous buildings constructed. It was not decommissioned until the late 1970s. Towers and buildings still remain but the recovering forest is slowly reinhabiting the site. Also during the 1970s developers began work on 175 hectares of park land intending to construct more than 2800 residential units. Construction began with borrow pits, canals, and road development until environmentalists were able to halt the project, which finally was abandoned in the mid 1980s. Scars from that construction are still clearly visible but reforestation is proceeding and is in various stages of recovery (Keith, 2005; Williams, 2010).

Institutional Abbreviations

FH, Farlow Herbarium, Harvard University, Cambridge; **FNPS**, South Florida Collections Management Center Herbarium, Homestead; **G**, Conservatoire et Jardin Votaniques de la Ville de Genèva, Switzerland; **H**, Finnish Museum of Natural History, Helsinki; **US**, Smithsonian Institution, Washington D. C.; **USF**, University of South Florida Herbarium, Tampa.

Collection Sites

The north end of the park was selected for the inventory (Fig. 3) as it had the advantage of possessing diverse communities at various stages of development in close proximity. This permits a comparison to determine if forest maturity, or lack thereof, influences lichen populations. In order to have significance, each site necessarily had to have at least some noteworthy characteristics different from the others. Thus, the sites were selected

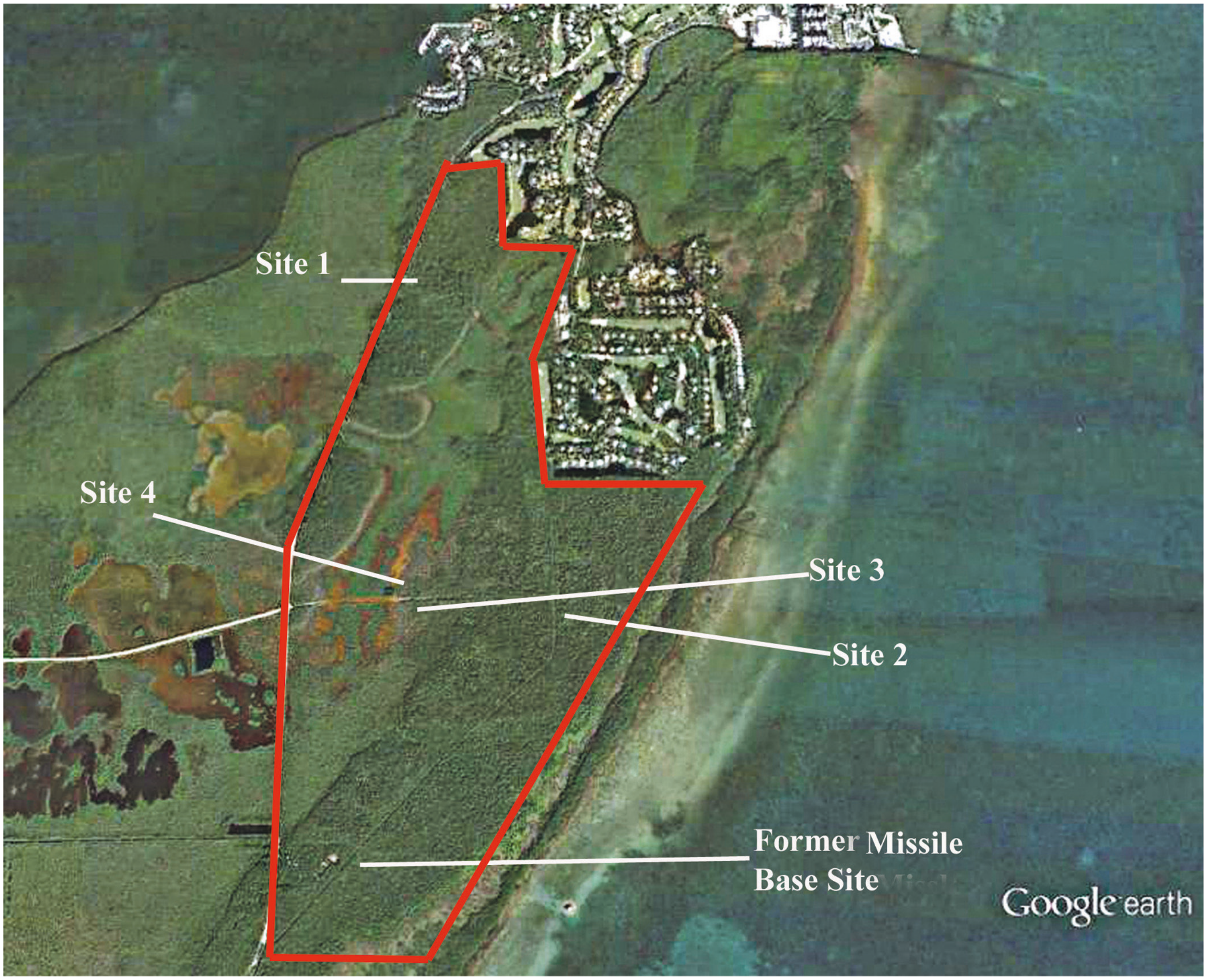

Figure 3. General location of the four collection sites utilized in this project in relation to missile base abandoned in the late 1970s. Courtesy Google maps.

for their diversity in forest maturity, light levels, hydrology, and tree species. Four sites were chosen with the requirement that each had to differ from the others in at least two criteria. Site 1 (Fig. 4A) is the most mature section with the tallest and widest crowned trees. Tree diversity is also greatest at this site (Table 1) that is on relatively high ground and would not flood except in extreme conditions. Site 2 (Fig. 4B) is a more even-aged, denser forest than site 1. It possesses less tree diversity and although also on high ground, there are several depressions scattered throughout that undoubtedly fill with water during the rainy summer months as evidenced by the lack of vegetation in them. Site 3 (Fig. 4C) was once a pine rockland forest that was clear-cut in the first half of the twentieth century. It has been slow to recover and is now inhabited by scattered broad-leaf tree species, *Sabal palmetto* and shrubs, some of which are associated with pine communities although pine is absent. Compared to sites 1 and 2, this area is slightly lower in elevation while the forest is more open, less organized, and

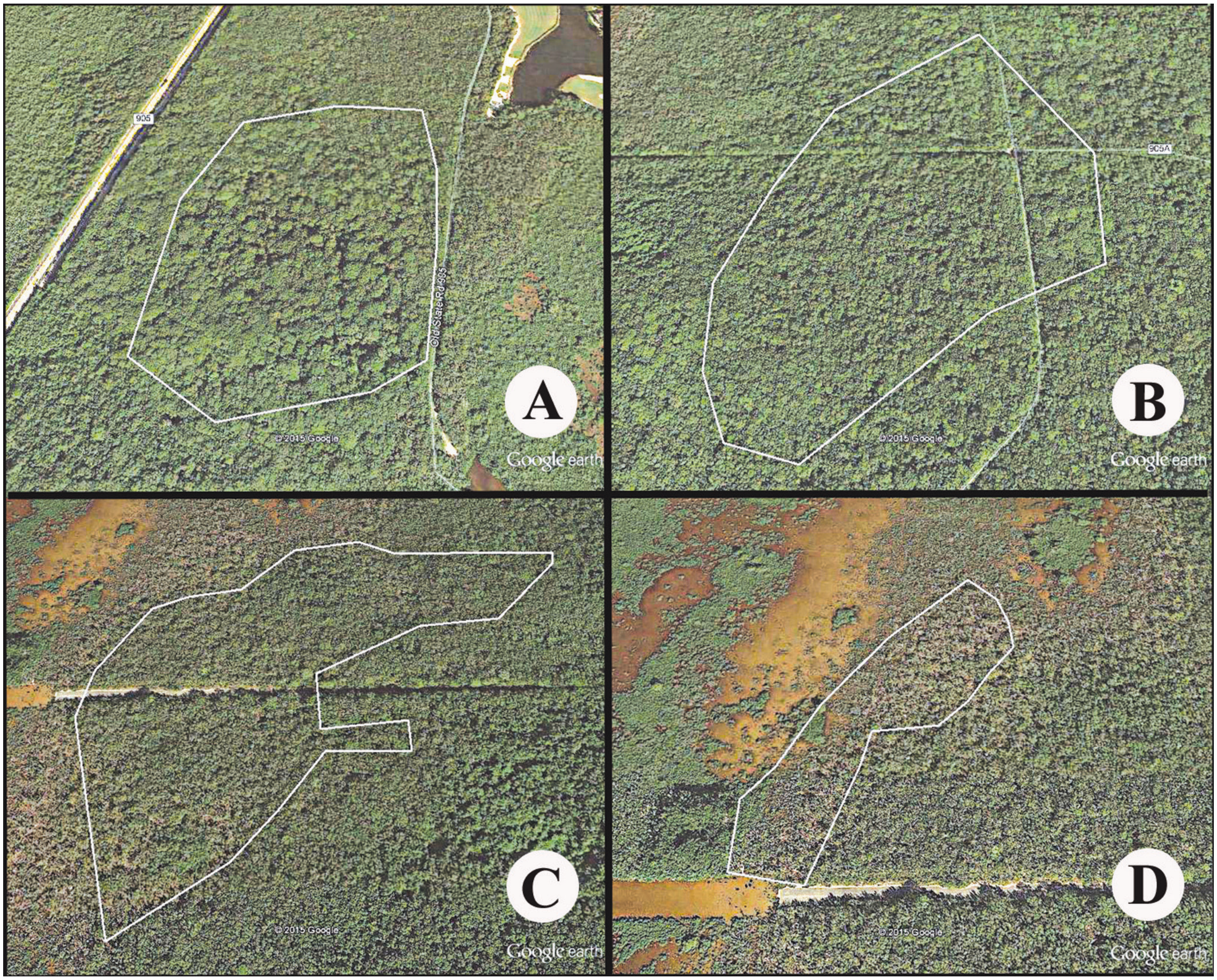

Figure 4. A–D, Aerial view of collection sites. **A,** Site 1. Note the taller trees with rounded crowns indicating an uneven-aged forest. **B,** Site 2. Forest mostly flat-topped and even-aged indicating an earlier successional stage. **C,** Site 3. Originally a South Florida slash pine forest clear-cut in the early 1900's, now an open canopied mixed forest with pineland associated shrubs. **D,** Site 4. An open exposed area dominated by stunted tree species. Courtesy of Google maps.

Table 1. Physical characteristics and collection data of each site within Dagny Johnson Key Largo Hammock Botanical State Park (Figs 2–4). The first three rows show some physical differences between Dagny collection sites with “1” the highest rating and “4” the lowest. For example, under hydrology site 4 would be wettest and site 1 driest. The numbers merely show a relationship among sites and have no other inference. Collection data is displayed in rows 4–10. Note the inordinate number of Graphidaceae obtained from site 1 and the disproportionate quantity of Arthoniaceae from site 4.

	Site one	Site two	Site three	Site four
Site maturity	1	2	3	4
Light level	3	4	2	1
Hydrology	4	3	2	1
Total collections	431	327	378	245
Total lichen species	172	83	119	73
Total phorophytes	42	26	17	6
Graphidaceae	164	68	57	58
Thelotremataceae[1]	57	14	2	4
% Thelotremateae	35	21	4	7
Graphis sp.	5	9	13	27
Arthoniaceae sp.	22	29	16	51
Lecanoraceae sp.	3	13	14	23
Physciaceae sp.	4	10	14	31
Pertusariaceae sp.	0	0	13	16

[1] As interpreted at the time of the Rivas Plata et al. study (2008).

less diverse with higher light levels. Site 4 (Fig. 4D) is the most exposed and inhabited by widely spaced short trees and shrubs, many of which are dead or senescent due to the influence of occasional tidal inundation. Tree diversity is sparse at this site with buttonwood (*Conocarpus erectus* L.) and red mangrove (*Rhizophora mangle* L.) dominating.

Sample Collection and Identification

Participants collected voucher specimens over two days, January 7–8, 2015. This was divided into two morning and two afternoon collection units, one spent at each of the four sites. Number of collections per site is given in Table 1. During the collecting process a local volunteer or park employee accompanied each ABLS member to identify tree species from which collections were obtained. Data for each collection included tree species and site number plus other usual collection data (collector, date, etc). Collections were then taken to the lichen laboratory in ENP for sorting and identification. Some members then returned home with their collections to complete the identification process while others left theirs with ENP researchers for the same purpose. Nearly all specimens were eventually returned to ENP so identifications could be rechecked for accuracy. Collections were examined using standard stereoscopic and light microscope techniques while all macroscopic and microscopic images were captured via computer using Leica Application

Suite V4.8.0 28 software. Several images were sharpened and contrast added via Adobe Photoshop 6.0 in order to better demonstrate identifying characteristics. Measurements of internal structures were obtained from untreated water mounts. Thin layer chromatography (TLC) was carried out in accordance with Orange et al. (2010), using System A, B^1, C and E. Abbreviations for spot tests and under coverslip applications are: C (sodium hypochlorite as commercial Chlorox), K (10% aqueous solution of potassium hydroxide), I (Lugol's solution 1%) and P (para-phenylenediamine crystals dissolved in 90% ethyl alcohol). Tholus staining was accomplished using the above potassium hydroxide followed by a 0.3% Lugol's solution. HPLC was conducted on a small number of specimens containing difficult to identify secondary metabolites, usually xanthones, by TLC.

RESULTS AND DISCUSSION

The participants of the inventory made an aggregate 1391 collections yielding 315 lichen species and 8 taxa of lichenicolous fungi representing 98 genera and 39 families. Nineteen of these represent species new to science and are described below. An additional 25 species are new additions to the North American lichen checklist. Two species, *Pertusaria rigida* Müll. Arg. and *Stirtonia alba* Makhija and Patw. are new to the Western Hemisphere. The high number of taxa new to science and North America is simply explained by the fact that no large scale lichen inventory has ever been conducted at the site. All species collected during this foray are itemized below with occasional annotations and synonymy.

Lücking et al. (2011) charted the lichen richness of 38 parks and preserves in North and Central America both in raw numbers and logarithmically. Two South Florida locations already inventoried (ENP and FSP) were included. Based upon an extrapolation of lichen species both present and likely to be present at these locations, the authors ranked each in the top five demonstrating the probability of a high degree of lichen richness for South Florida parks and preserves. This is all the more remarkable as South Florida lacks some of the features which augment lichen populations elsewhere. For example, some lichens are restricted to silicaceous rocks but these are absent from South Florida as the rock substrate is uniformly some form of limestone. Soil crustose lichens are essentially absent as robust native grasses and thick layers of leaf litter discourage their formation. Furthermore, a diverse geography with severe elevational gradients presenting a variety of solar aspects, temperature gradients and hydrological features, known to be additive to species diversity including lichens, are not a part of the South Florida landscape (Welch and Madden, 1999).

Even without these advantages, the 315 species currently known from Dagny would rank in the middle of the 38 listed preserves in the Lücking et al. (2011) chart. However, using the same parameters employed by the FSP study, we believe Dagny is at most 70–80% collected, meaning the actual lichen flora of the site is likely to be between 390 and 450 species. By this estimate it would rank 10th to 12th in lichen species present and yet it is the 35th smallest at only 10 km^2. Although the smallness of the park makes log-area comparison meaningless, it is interesting to observe that Rocky Mountain National Park, ranked just ahead of Dagny is 105 times larger. In fact, this is true for all sites above Dagny in the chart as they range from 5–600 times larger. This coincides with the contention of many that subtropical vegetation has the capability of sustaining a high lichen diversity (Aptroot et al., 2007; Cáceres, 2007; Lücking et al., 2011; Cáceres et al., 2014).

Table 1 gives some insight into lichen spatiality and environmental preferences within Dagny. While we can think of no statistical analysis which would have meaning, the data is still suggestive for further thought. The larger number of collections from site 1 is indicative of its greater lichen richness. This is logical, as a group collecting in a lichen-rich area would obviously make more collections than from a lichen-poor area. In addition, more individual species were obtained from that site making it the most favored lichen habitat surveyed during the foray. This is perhaps accounted for by the forest maturity that provides older trees and a more advantageous light environment. It also has a significantly larger variety of available phorophytes (Table1), which translates into a larger choice of substratal textures that may also augment lichen populations. Although no obvious relationship between lichens and tree species was observed, some taxa collected in this foray had a clear preference for smooth bark, e.g. *Pyrenula adacta* Fée, *Graphis cincta* (Pers.) Aptroot, and *Pertusaria* spp. This observation was based upon 56 aggregate collections.

The high number of Graphidaceae species collected at site 1 is accounted for by the large number of taxa within the subfamilies Fissurinoideae (mostly *Fissurina* Fée) and Graphidoideae, specifically the tribe Thelotremateae within that subfamily (see more on this below). The genus *Graphis* Adan. was nearly absent at site 1 and sparse at site 2 but abundant at sites 3 and 4, indicating preference for a more intense light environment. This is further emphasized as site 4 (most exposed to sunlight) accounted for 50% of all *Graphis* in the inventory.

Rivas Plata et al. (2008) showed several genera including Thelotremataceae (as defined at the time of the study) demonstrate preference for relatively undisturbed older primary or secondary forests and the bark of mature trees. Therefore, these families may be useful as a measure of succession trends of secondary forests, the severity of past disturbance, and as bioindicators of ecological continuity. Conversely their study found other lichen families, such as Lecanoraceae, Physiaceae, and Pertusariaceae, to be indicators of disturbed forests at earlier stages of development. The Dagny lichen inventory and its four differing ecological zones give an opportunity to determine if an analysis of lichen collection sites in this study would yield similar spatiality in relationship to the lichen families found to be indicators by Rivas Plata et al. (2008). These factors may be of interest to forest managers and researchers as at this time in our history there is an intensification of attempts to reverse and reclaim damage done in the past by logging and commercial development of public lands. Periodic lichen inventories of such areas might give insight into the success, or at least the successional progression, of such reclamation projects.

The Dagny data in Table 1 appears to be consistent with the above study. The former lichen family Thelotremataceae showed a partiality for site 1 (Fig. 4A). The latter is farthest along in successional development and thus closer to equilibrium and greater productivity, i. e. the more ideal condition. Fifty-seven specimens of Thelotremataceae were collected from site 1, 74% of the total from the foray. Conversely, species within Thelotremataceae were nearly absent at the least developed sites 3 and 4 (Figs. 4C–D). Furthermore, the three lichen families (Lecanoraceae, Physciaceae, and Pertusariaceae) more common at less developed sites in the Rivas Plata study, showed the same pattern at Dagny's more exposed, least mature sites 3 and 4, coinciding with the above study. Table 1 alludes to an affinity for high light levels for both the genus *Graphis* and the family Arthoniaceae. The 27 *Graphis* collections from site 4 included 8 species, while the 51 Arthoniaceae were represented by 5 genera and 13 species.

As aforementioned, the current lichen inventory at Dagny is the third such undertaking in a relatively confined geographical location, the other two sites being Everglades National Park and Fakahatchee Strand Preserve State Park. Although FSP is only about ten kilometers from the northwest corner of ENP and Dagny is less than 20 kilometers from the southeastern mainland corner of the same park, the three differ in physical structure, botanical composition, and weather (Table 2). The subjective categories (e.g. temperate/tropical, upland/lowland) are relative and not absolute. Due to its large size, ENP possesses extensive areas similar or equal to both of its neighbors making comparisons between it and the other two entities of only muted value. Even so, the data for ENP is included as it provides other information of interest.

Although logged extensively for its cypress trees in the past and then platted for development in the 1970s, FSP's forest is well-developed by Florida standards. It is oriented north-south following a slough and is regarded as a swamp forest. The slough is flooded to some degree much of the year, especially during the summer rainy season when it

Table 2. A brief comparison of meteorological and physical differences between Dagny, Everglades National Park and Fakahatchee Strand Preserve State Park that influence lichen abundance and diversity. All data from NOAA onsite weather stations except Fakahatchee which is the average of Everglades City to the south and Immokalee to the north.

Relative forest characteristics	Key Largo	Everglades	Fakahatchee
Human disturbance	high	low	moderate
Light level in forest	highest	lowest	moderate
Air circulation	high	low	moderate
Geography	upland	Upland/lowland	lowland
Arboreal makeup	tropical	Tropical/temperate	temperate
Substrate condition	driest	Moderate	wettest
Mean annual rainfall[1]	117 cm	118 to 138 cm[2]	135 cm
Mean Jan. low temperature[1]	17°C (62.5°F)	13.5C (56.4°F)[2]	11°C (52.3°F)

[1] 1989–2014.
[2] Royal Palm (north) and Flamingo (south) data

becomes nearly waist deep in places. This type of forest exists in areas of ENP but is absent at Dagny. Although summer temperatures are quite similar at all sites, Table 2 shows a significant difference between Dagny and FSP during winter months with an average deviation of about 6° C. Even though FSP is only about 70 km (40 miles) north of the latitude of Dagny, its winter climate is surprisingly cooler and wetter. This is explained by its inland location deprived of the warming influence of the Gulf Stream so prominent at Dagny. This also explains the sites' different botanical characteristics.

Table 3 illustrates a surprisingly high incidence of lichens exclusive to each site, reaching over 40% at FSP. Two possible reasons might account for this. First, the variation in site characteristics, i.e. botanical, climatic, and physical traits, could certainly affect lichen populations. But if this were the accountable factor in this study, it would be expected that ENP, having the aforementioned characteristics of both sites, would have far fewer species unique to it than is the case. A second more plausible explanation suggests that there is a high degree of uncertainty in ascospore and diaspore dispersal or, alternately, when dispersed to find the necessary ingredients for survival. Although some lichens are widely dispersed or even pantropical, most are not (Lucking et al., 2014). Data from ENP shows nearly 18 percent of lichens collected there have been found at only one location within that park. Table 3 also shows that ENP shares a large number of taxa with each neighbor that are absent from the third site. For instance, 129 species are shared by ENP and FSP on the west but all are absent at Dagny at the eastern side of ENP. A similar condition exists between ENP and Dagny. But only 12 species are exclusive to Dagny and FSP and thus absent from ENP. Therefore, one might logically conclude that even at relatively small incremental distances lichen dispersal decreases as distance increases.

Figure 5 depicts the raw number of collections within three lichen families, Arthoniaceae, Graphidaceae, and Roccellaceae, generally regarded to be more tropical in their distribution (Hale, 1974; Sundin and Tehler, 1998; Ertz and Tehler, 2011; Rivas Plata et al., 2012; Frisch et al., 2014). These were selected to determine if the winter climatic differences between Dagny and FSP would influence their presence at each site. Although far fewer collections were made at Dagny than at FSP, species of Roccellaceae were considerably greater at the more tropical site. The difference is even greater when the number of Roccellaceae is

Table 3. Comparative collection data of lichen species in the three southern Florida preserves.

Category	**Number of species**	
Unique to Dagny	57	18 % of total collections
Unique to FSP	174	40 % of total collections
Unique to ENP	190	34 % of total collections
Common to Dagny and ENP	75	23 % of Dagny collections
Common to Dagny and FSP	12	4 % of Dagny collections
Common to ENP and FSP	129	30 % of FSP collections

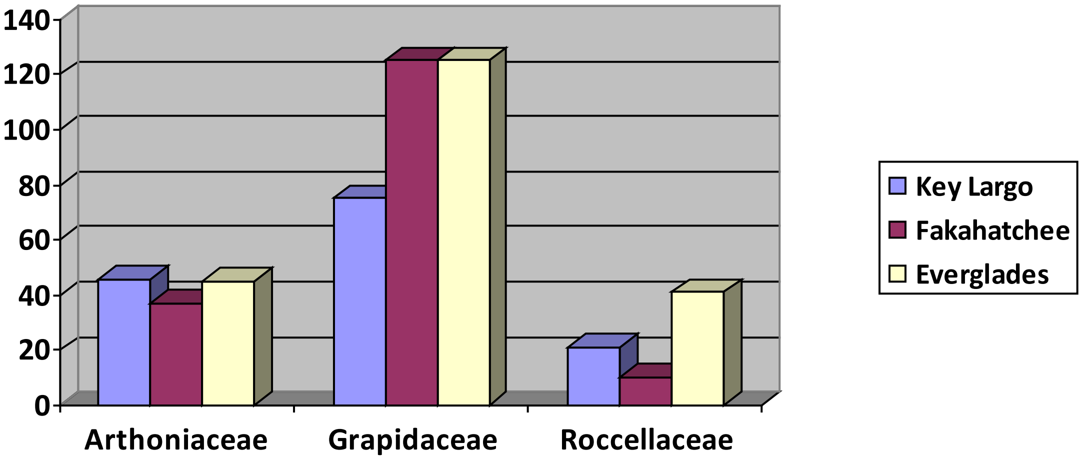

Figure 5. Number of species acquired from each of three South Florida locations within three lichen families regarded to be more tropical in their distribution.

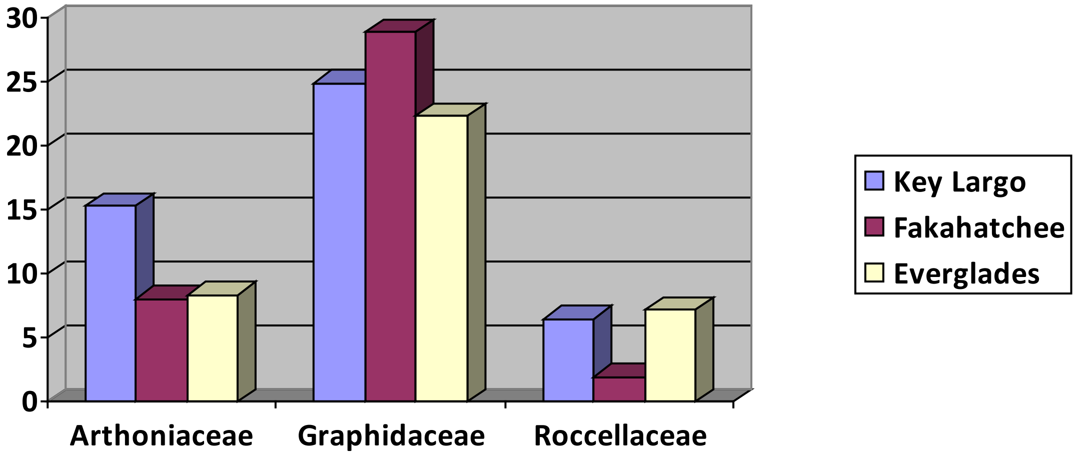

Figure 6. Bar chart expressing the data in Figure 5 as a percent of all species collected.

expressed as a percent of all species found (Fig. 6). In the case of Arthoniaceae the number of species found at each site was not distinctly different (Fig. 5). But when viewed as a percent of all species collected, Dagny significantly exceeds FSP as nearly 15% of all species were from Arthoniaceae. When applied to Graphidaceae, the data is not nearly as clear. Figure 6 shows Graphidaceae as a percent of species collected, FSP exceeds Dagny by a small margin, which is contrary of what would be expected if climate were to influence the presence or absence of tropical lichen families at the two sites. This might be explained by the enormous size of the family which, although predominately tropical, has many species, particularly within the genera *Graphis* and *Fissurina*, that venture well north into more temperate regions along the Gulf Coast and Southeast Coastal Plain. To explore this further we excluded such taxa by segregating the tribe Thelotremateae, which occurs within the family Graphidaceae, but is considerably more tropically oriented in its distribution than the family as a whole (Fig. 7). There is a one-third greater chance of encountering a species within tribe Thelotremateae at Dagny compared to FSP.

In summary, the four sites at Dagny show that forest maturity, or lack thereof, has at least some controlling influence over their respective lichen flora. Also at Dagny the family Thelotremataceae (as formerly defined) may be a harbinger of forest maturity and might be used in some way by those involved in forest reclamation.

A comparison of the three South Florida preserves gives an insight into the difficulty a surprisingly large number of lichens have in dispersing themselves over even short distances. For instance, it appears from current collection data that 364 species have not been able to make the short journey from ENP to FSP, or vice versa, while the same would be true for 247 taxa between ENP and Dagny. Even if one assumes that some of the missing species are simply a function of not yet being found, the numbers are still significant. Mechanics of lichen reproduction (ascospores, diaspores, etc.) are well understood but lichen dispersal is not. The large number of species that appear to have problems replicating colonies even over short distances, are balanced to a smaller degree by taxa known to be dispersed around the globe in their climatic niches. These obviously possess some competitive dispersal superiority not well understood at present.

Finally, the data in Figures 5, 6, and 7 suggest differing micro-climatic conditions, even at sites relatively close to one another, play a significant role in defining lichen flora in South Florida. This and the subject of lichen dispersal will be addressed in more detail in a future publication concerning

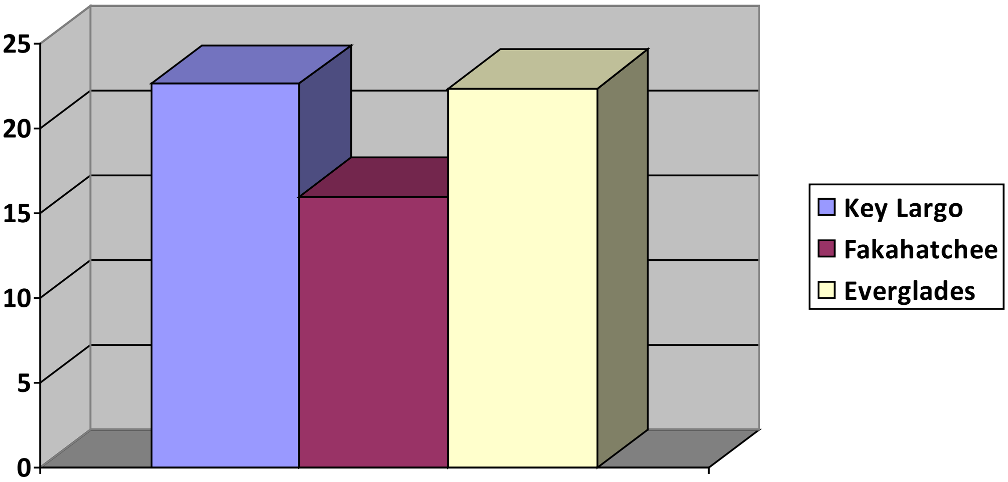

Figure 7. Collections of the highly tropical oriented tribe Thelotremateae as a percentage of total species of Graphidaceae collected.

the lichens of Everglades National Park.

DESCRIPTIONS AND PHOTOGRAPHS OF NEW SPECIES

Acanthothecis floridensis F. Seavey and J. Seavey, sp. nov.

Figure 8A–D Mycobank No. 819825

Diagnosis.—Similar to *Acanthothecis kalbi* but with considerably larger 5-8-celled ascospores.

Type Locality.—U.S.A., Florida, Monroe County: Dagny Johnson Key Largo Hammock Botanical State Park, margin of an abandoned road 1.5 kilometers east of Crocodile Lake, 25°17′ N, 80°18′ W, corticolous on *Swietenia mahagoni* in poorly organized open forest with *Sabal palmetto,* 8 January 2015.

Holotype.—*Seavey and Seavey 15332*, deposited at USF.

Description.—Thallus corticolous, pale gray, smooth, matte, corticate, continuous, 1–2 cm diam., 130–160 µm thick, margins determinate. Cortex inspersed with small crystals 5–15 µm thick. Photobiont layer with scattered large crystals, 20–30 µm thick. Photobiont *Trentepohlia*. Ascomata lirelliform, immersed, slit-like to gaping, flexuous to short-branched, 0.30–1.0 mm long, with labiate thalline margin. Disc pale brown, pruinose. Excipulm entire, hyaline, thin, to 10 µm wide, uncarbonized. Epihymenium hyaline, 10–15 µm high. Hymenium hyaline, not inspersed, 50–80 µm high. Hypothecium pale yellow, 14–18 µm high. Paraphyses distinctly and abundantly spinulose (knobbed at tips). Periphysoids present, spinulose, 8–12 µm long. Asci clavate, 8-spored, 60–70 × 16–20 µm. Ascospores hyaline, oblong or ellipsoid with one end tapered, 22–27 × 6.0–6.5 µm, 5–7(8)-celled, non-amyloid. Pycnidia not detected.

Chemistry.—Thallus K+ red, C–, P+ orange. TLC: norstictic acid.

Etymology.—Referring to the state of Florida, i.e. *Acanthothecis* of Florida.

Distribution and Habitat.—*Acanthothecis floridensis* was collected only once from an open sunny habitat among short arboreal species. Historically the area was anthropogenically severely disturbed and has been slow to recover. It was poorly sampled during the foray and additional investigations may reveal more examples.

Discussion.—The new species is similar to *Acanthothecis paucispora* Lendemer and Harris as both have small ascospores which is somewhat atypical for the genus. However, *A. floridensis* can be easily separated by its longer ascospores and the presence of norstictic acid. The sympatric *Acanthothecis poitaeoides* (M. Wirth and Hale) E. Tripp and Lendemer and *Acanthothecis aurantiaca* (Müll. Arg.) Staiger and Kalb, also found abundantly during this foray, share the same chemistry as the new species but have much longer ascospores which are rarely less than 10-locular (Staiger, 2002).

Arthonia pseudostromatica F. Seavey and J. Seavey, sp. nov.

Figure 8E–H Mycobank No. 819826

Diagnosis.—*Arthonia* with brown lirellate ascomata immersed in white pseudostroma.

Type Locality.—U.S.A. Florida. Monroe County: Dagny Johnson Key Largo Hammock Botanical State Park, 0.35 kilometers east of State Route 905 and 1.7 kilometers north-northeast of the junction of State Route 905 and Card Sound Road, 25°18′ N, 80°18′ W, corticolous on *Piscidia piscipula* in upland mature hammock forest, 7 January 2015.

Holotype.—*Seavey and Seavey 15010*, deposited at USF.

Isotype.—*Seavey and Seavey 15105*, deposited at Seavey hb.

Description.—Thallus crustose, corticolous, greenish white, shiny, discontinuous; cortex 17–35 µm thick, inspersed with continuous layer of irregularly shaped crystals up to 15 µm diam. Photobiont *Trentepohlia*. Ascomata brown, lirelliform, partly branched, 0.50–0.90 × 0.03–0.08 mm, immersed in raised white pseudostromatic-like tissue, up to 350 µm high, the latter densely inspersed with colorless crystals. Exciple not detected. Hamathecium gray, with densely anastomosing paraphysoids. Asci *Arthonia* type, fissitunicate, internal layer with typical centrally positioned apical peak, subglobose to globose, 90–110 × 80–90 µm, stipe c. 15 µm long, 8-spored, I–.

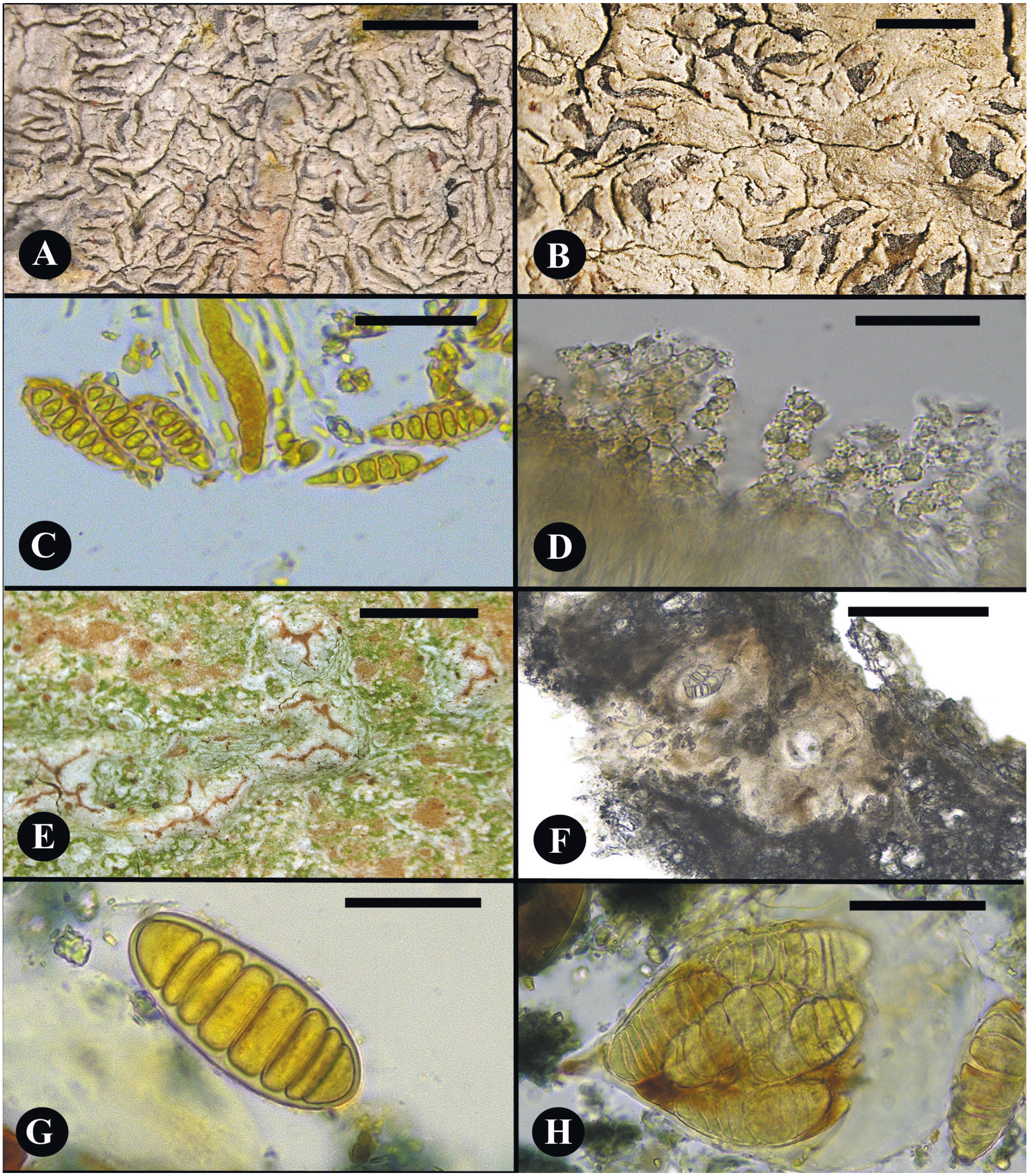

Figure 8. A–D, *Acanthothecis floridensis*. **A–B,** Habitus. **C,** Ascospores. **D,** Warty spinulose paraphyses tips. **E–H,** *Arthonia pseudostromatica*. **E,** Habitus. **F,** Thin section of ascomata. **G,** Ascospore. **H,** Ascus with 8 ascospores. Scales. A = 1 mm. B = 100 µm. C = 20 µm. D–F = 1 mm. G = 5 mm. H = 30 µm.

Ascospores hyaline, ellipsoid, 47–56 × 19–22 µm, 8–10-celled frequently with two middle cells and each end cell larger than the others. Pycnidia not detected.

Chemistry.—Thallus K–, C–, P–, UV–. TLC: no substances.

Etymology.—Refers to the lirelliform ascomata arranged within white pseudostromata.

Distribution and Habitat.—Both holotype and isotype collections are corticolous on *Piscidia piscipula* although from different sites (sites 1 and 2). The cortex of that species is extremely smooth while the epicortex is thin and paperly and separates from the subcortex easily. This species has also been collected at Everglades National Park also on *P. piscipula* and from a coastal environment. More collections are needed to determine if this is significant.

Discussion.—Pseudostromatic ascomata are known in *Synarthonia* Müll. Arg., another genus within Arthoniaceae, but its ascomata are obligately mono-to-pluri-carpocentral in pseudostromatal tissue (Joseph and Sinha, 2015) unlike the simple lirelliform ascomata of the new species. A search of the more than 120 named species listed for Florida and nearly an additional 100 originating from the Neotropics and Caribbean region failed to reveal an *Arthonia* with lirella arranged in pseudostroma. Although these collections currently fall within the parameters of *Arthonia*, we suspect future molecular investigation will eventually find a separate generic placement for this taxa.

Additional Specimen Examined.—U.S.A. Florida. Monroe County: Everglades National Park, near Key Largo ranger station, in West Indian coastal hammock, April 8, 2014, *Seavey and Seavey 6620* (FNPS).

Coenogonium maritimum **F. Seavey and J. Seavey, sp. nov.**
Figure 9A–D Mycobank No. 819828

Diagnosis.—Similar to *Coenogonium saepincola* but differing by its larger apothecia, yellow apothecial discs, and a gray-green thallus.

Type Locality.—U.S.A. Florida. Monroe County: Dagny Johnson Key Largo Hammock Botanical State Park, 1.25 kilometers east southeast of the junction of State Route 905 and Card Sound Road, 25°17′ N, 80°17′ W, corticolous in upland recovering forest, on *Ficus aurea.* 8 January 2015.

Holotype.— *Seavey and Seavey 15012*, deposited at USF.

Description.—Thallus smooth, crustose, corticolous, corticate, 3–8 cm diam., 40–100 µm tall, gray-green, shiny, continuous, with or without a white prothallus. Photobiont *Trentepohlia.* Apothecia sessile, round, biatorine, 0.4–0.6 mm diam., 240–300 µm tall. Disc plane, yellow, becoming orangish with age; margin prominent, smooth at first becoming uneven granulose, white to cream. Exciple paraplectenchymatous, interior hyaline, outer margin pale gray to gray, 45–60 µm wide. Hypothecium yellow, 40–75 µm high. Hymenium hyaline, subhymenium pale yellow, 55–65 µm high, I+ blue-green becoming red-brown. Asci cylindrical, 50–60 × 7–8 µm. Ascospores hyaline, uniseriate, oblong, ellipsoid or fusiform, 2-celled, 10–13 × 2.8–3.4 µm. Pycnidia not detected.

Chemistry.—Thallus K–, C–, P–. TLC: no substances.

Etymology.—Species epithet refers to the seaside location where the new species was collected.

Distribution and Habitat.—*Coenogonium maritimum* was collected twice during this foray. A review of Everglades National Park material revealed another six collections conforming to this taxa. Although the new species has been collected on a wide variety of tree bark, all collection sites have been from open canopy forests, exposed solitary trees, or at the margin of closed canopy forests.

Discussion.—In Rivas Plata (2006) *Coenogonium maritimum* keys to *Coenogonium* aff. *luteolum* (Kalb) Kalb and Lücking and may be the same taxa. Apparently the latter specimen was small and insufficient for type material. Although the type specimen used here is without a prothallus, some Everglades material identical in all other respects exhibit a clear but poorly developed white prothallus. The closest related sympatric *Coenogonium, Coenogonium subdilutum* (Malme) Lücking, Aptroot and Sipman differs by its smooth apothecial margins and a verruculose thallus. In the

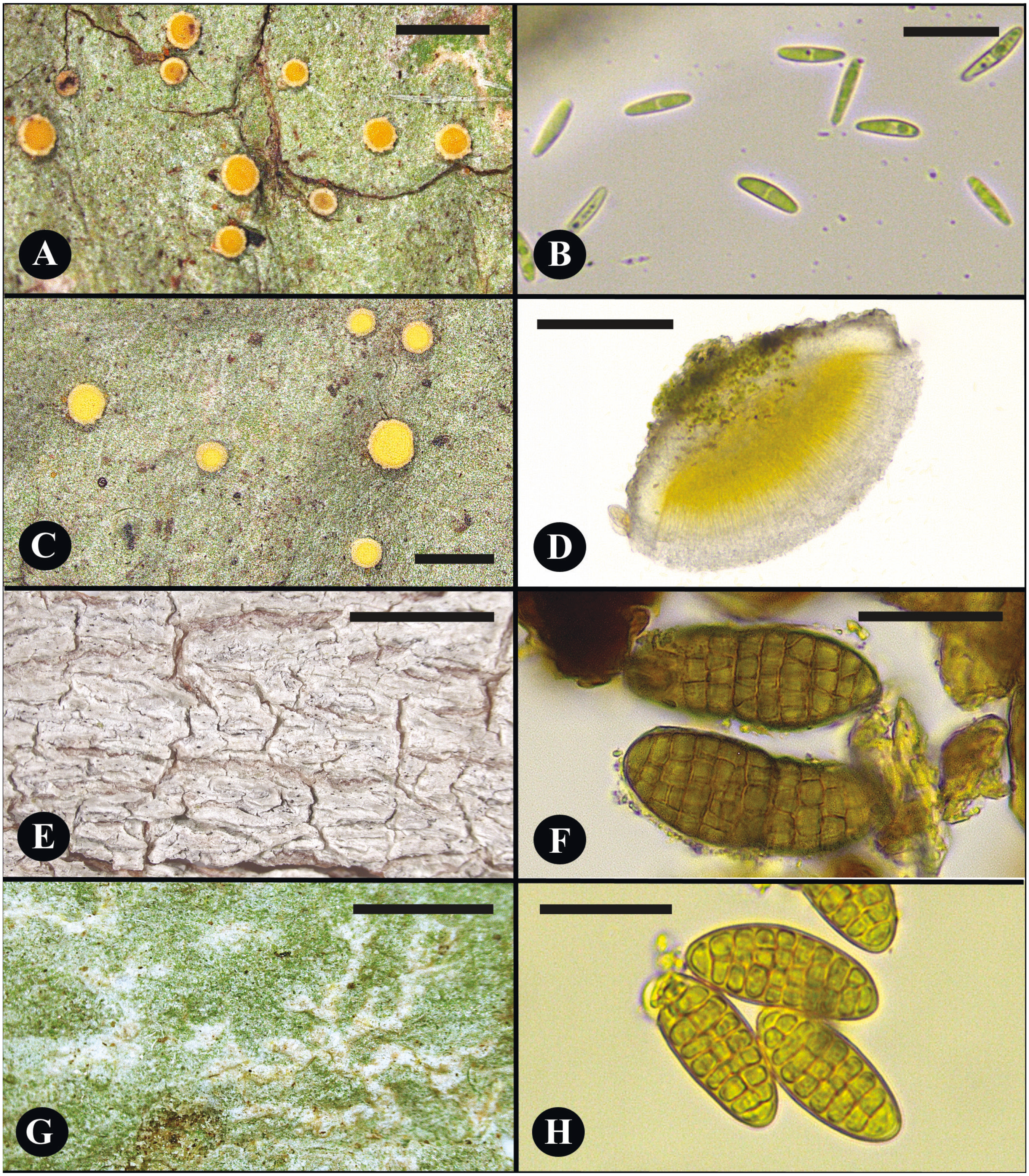

Figure 9. A–D, *Coenogonium maritimum*. **A,** Thallus and apothecia fading to orange with age. **B,** Ascospores. **C,** Fresh apothecia with uneven granulose margins. **D,** Thin section showing vivid yellow hypothecium. **E–F,** *Cryptothecia calusarum*. **E,** Habitus. **F,** Hyaline ascospores treated with Lugol's solution. **G–H,** *Cryptothecia randallii*. **G,** Habitus. **H,** Ascospores. Scales. A = 2 mm. B and H = 20 µm. C = 1 mm. D = 50 µm. E and G = 1 cm. F = 25 µm.

Rivas Plata key, *Coenogonium saepincola* Aptroot, Sipman and Lücking, also described from Costa Rica, keys closest to *C. maritimum* differing by thallus color, its lignicolous habit, and denticulate apothecia margins.

Additional Specimens Examined.—U.S.A. Florida. Miami-Dade County: Everglades National Park, north of Ficus Pond, on *Taxodium* in cypress strand, 6 January 2011, *Seavey and Seavey 4865*; near Ficus Pond trail on *Ilex* in bayhead, 8 May 2011, *Seavey and Seavey 4820, 4821*; west of missile base, on *Ilex* in prairie, 25 March 2012, *Seavey and Seavey 691A*; Barbour Hammock, on *Ocotea coriacea* in hammock forest, 3 March 2013, *Seavey and Seavey 5796*; East Everglades near Context Road, on *Persea* in swamp forest, 17 February 2011, *Seavey and Seavey 4951,* all FNPS.

Cryptothecia calusarum F. Seavey and J. Seavey, sp. nov.

Figure 9E–F Mycobank No. 819829

Diagnosis.—Similar to *Cryptothecia subnidulans* but asci randomly dispersed across thallus and lacking gyrophoric acid.

Type Locality.—U.S.A. Florida. Monroe County: Dagny Johnson Key Largo Hammock Botanical State Park, .8 kilometers east-northeast of junction of State Route 905 and Card Sound Road, 25° 17′ N, 80°17′ W, in open successional woodland, corticolous on *Eugenia foetida*, 8 January 2015.

Holotype.— *Seavey and Seavey 15309*, deposited at USF.

Description.—Thallus crustose, corticolous, white, thin, granulose, endophloedal, continuous, ecorticate, densely inspersed with small clear crystals 5–15 µm diam. Distinct medullary layer absent, hyphae instead highly branched, anastomosing and intertwined with photobiont, I+ red. Photobiont *Trentepohlia*. Ascigerous areas not delimited. Asci subglobose to globose, randomly scattered and immersed across thallus, 70–85 × 60–70 µm, wall thickened apically, 4-spored but 2–3 usually aborting. Ascospores, hyaline, densely muriform, ellipsoid, 50–55 × 20–22 µm, constricted at mid septa, I+ brown.

Chemistry.—Thallus K–, C–, P–. TLC: no substances.

Etymology.—Commemorating the Calusa, a loose federation of Native Americans who resided in South Florida and Key Largo for more than two millennia.

Distribution and Habitat.—Known only from the type collection within an exposed successional woodland.

Discussion.—*Cryptothecia calusarum* is only known from the type collection but is a non-descript species easily overlooked in the field as there are no well delimited ascigerous zones which may lead to its premature disposal. *Cryptothecia subnidulans* Stirt. is somewhat similar to the new species in ascospore size and number per ascus but produces gyrophoric acid and at least moderately well delimited ascigerous areas (Makhija and Patwardhan, 1994). *Cryptothecia striata* Thor is the only other North American *Cryptothecia* without delimited ascigerous areas. However, its asci are one-spored, ascospores are considerably larger, and the thallus contains gyrophoric acid (Thor 1991, 1997).

Cryptothecia randallii F. Seavey and J. Seavey, sp. nov.

Figure 9G–H Mycobank No. 819830

Diagnosis.—*Cryptothecia* with white ascigerous zones, small muriform ascospores and containing divaricatic acid.

Type Locality.—U.S.A. Florida. Monroe County: Dagny Johnson Key Largo Hammock Botanical State Park, .2 kilometers east of State Route 905 and 1.7 kilometers northeast of the junction of State Route 905 and Card Sound Road, 25°18′ N, 80°17′ W, corticolous on *Bourreria succulenta* in mature upland hammock forest, 7 January 2015.

Holotype.—*Randall 1005*, deposited at USF.

Isotype.—*Randall 1002*, deposited at Seavey hb.

Description.—Thallus gray-green, thin, continuous, ecorticate, somewhat shiny, 100–150 µm thick, densely inspersed with oxalate crystals 25–33 µm diam. Photobiont *Trentepohlia*. Ascigerous areas delimited and indicated by white linear algal-free, powdery zones, 175–250 µm thick. Asci globose, subglobose to finally ovate as ascospores develop, 60–70 × 40–45 µm, wall greatly thickened distally, 8-spored, either singly dispersed in ascigerous areas or grouped and then superficially visible as punctiform brown spots. Ascospores, hyaline, submuriform to muriform, ellipsoid, 26–36 ×12–14 µm, 6–8 × 3–4-locular.

Chemistry.—Thallus K–, C–, P–, UV+ white. TLC: divaricatic acid.

Etymology.—Species epithet is in honor of Bruce Randall, science educator, caver, and amateur lichenologist, who has unselfishly donated hundreds of hours to search and rescue missions and emergency medical response to the benefit of many. This project benefited greatly from his participation.

Distribution and Habitat.—Known only from five collections within Dagny Johnson Key Largo Hammock Botanical State Park. The new species was found exclusively in the park's most mature forest on smooth-barked trees.

Discussion.—Divaricatic acid is a rare metabolite among species of *Cryptothecia.* Makhija and Patwardhan (1987) reported *Cryptothecia scriblitella* (Nyl.) Makhija and Patwardhan to contain barbatic acid but later Makhija and Patwardhan (1994) mention it having divaricatic acid followed by a question mark. If one assumes the later publication is a correction of the former and *C. scriblitella* does contain divaricatic acid it would be the only other *Cryptothecia* with that chemistry. It differs from the new species by its much larger ascospores (50–90 × 33–40 µm). The recently described *Cryptothecia fuscopunctata* F. Seavey and J. Seavey has similar size ascospores but a chemistry of atranorin and barbatic acid.

Additional Specimens Examined.—U.S.A. Florida. Monroe County: Dagny Johnson Key Largo Hammock Botanical State Park, *Podaril KL056*, corticolous on *Ocotea coriacea* in open woodland; *Randall 1067*, corticolous on *Guettarda scabra* in mature forest, *Randall 1076*, corticolous on *Sapindus saponaria* in open woodland; *Seavey and Seavey 15401*, *corticolous on Eugenia axillaris* in second growth early successional forest, *15405*, corticolous on *Guapira discolor* in second growth early successional forest.

***Cryptothecia submacrocephala* F. Seavey and J. Seavey, sp. nov.**

Figure 10A–C Mycobank No. 819831

Diagnosis.—Similar to *Cryptothecia macrocephala*, differing by smaller ascospores.

Type Locality.—U.S.A. Florida. Monroe County: Dagny Johnson Key Largo Hammock Botanical State Park, .7 kilometers east of junction of State Route 905 and Card Sound Road, 25˚17′ N, 80˚ 18′ W, corticolous on *Swietenia mahagoni* in shrubby open woodland, 8 January 2015.

Holotype.—*Seavey and Seavey 15486*, deposited at USF.

Description.—Thallus thin, gray-green, crustose, corticolous, somewhat shiny, ecorticate, 1–1.5 cm diam., with 5–10 µm diam. clear crystals evenly dispersed across the surface, 50–100 µm high. Photobiont *Trentepohlia*. Ascigerous areas delimited by slightly raised pale brown zones 0.4–1.0 mm diam., 140–160 µm high, I+ red in section, usually circumscribed by thalline cracks caused by vertical expansion of ascigerous areas. Asci subglobose, 45–55 × 50–55 µm, wall thickened apically, 8-spored, but usually with 1–3 aborting, evenly dispersed throughout ascigerous zone. Ascospores, hyaline, muriform but with large rounded terminal cell, obovate, 25–29 × 10–11 µm; the muriform part 5–7 × 2–3-locular. Pycnidia not detected.

Chemistry.—Thallus K–, C–, P+ yellow, UV–. TLC: psoromic acid.

Etymology.—Species name refers to its close similarity to *Cryptothecia macrocephala* E. L. Lima, M. Cáceres and Aptroot.

Distribution and Habitat.—Known only from the type collection within Dagny Johnson Key Largo Hammock Botanical State Park. It was collected from a poorly developed open woodland purported once to have been a pine forest before human disturbance.

Discussion.—*Cryptothecia macrocephala* was described from Brazil with the same chemistry and other traits which appear to be close to *Cryptothecia submacrocephala* (Menezes et al., 2013). However, the ascospores for that taxon are

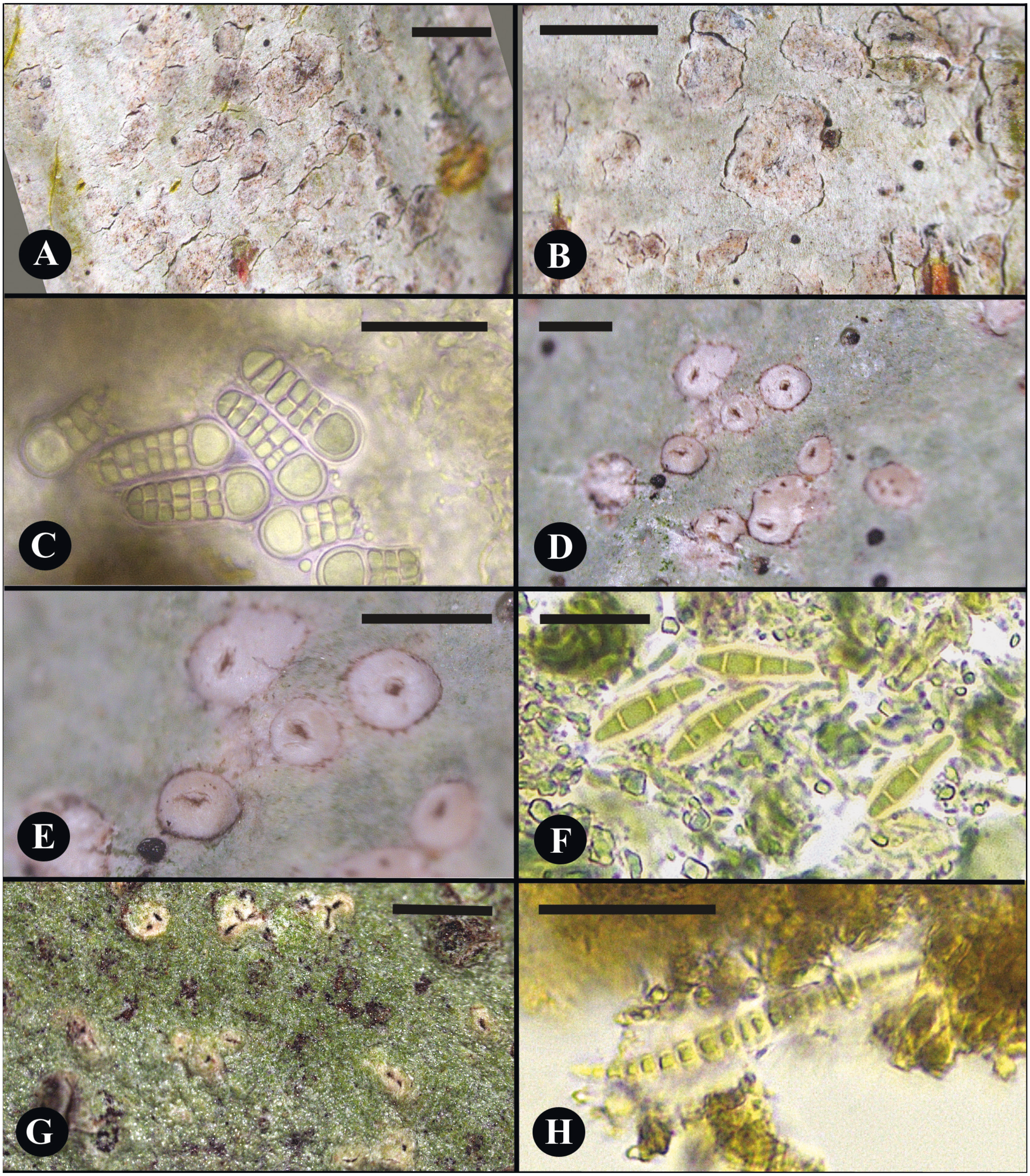

Figure 10. A–C, *Cryptothecia submacrocephala*. **A–B,** Habitus. **C,** Ascospores. **D–F,** *Enterographa bagliettoae*. **D–E,** Habitus. **F,** Ascospores. **G–H,** *Enterographa johnsoniae*. **G,** Habitus. **H,** Ascospore. Scales. A = 2 mm. B, D, E and G = 1 mm. C and H = 25 µm. F = 20 µm.

reported to be nearly twice as long, and considerably wider, than the new species. Ascospore size variation is known among lichens of the same genus and species from widely separated areas. However, we are not cognizant of any species where the gradation is as great as that exhibited by the degree of variation between *C. macrocephala* and *C. submacrocephala*. Thus we believe the description of a new species is warranted.

***Enterographa bagliettoae* F. Seavey and J. Seavey, sp. nov.**

Figure 10D–F Mycobank No. 819832

Diagnosis.—Lichenicolous on *Bagliettoa baldensis* with 1–5 ascomata immersed in raised white galls.

Type Locality.—U.S.A. Florida. Monroe County: Dagny Johnson Key Largo Hammock Botanical State Park, 25˚17´ N, 80˚17´ W, about 1.1 kilometers east-southeast of the junction of State Route 905 and Card Sound Road, lichenicolous on *Bagliettoa baldensis* on rock outcrop in upland forest, 8 January, 2015.

Holotype.—*Seavey and Seavey 15501*, deposited at USF.

Description.—Thallus lacking. Ascomata brown, 0.03–0.07 mm diam., punctiform to slightly elongate, 1–5 aggregated in distinctly raised white galls, 0.30–0.65 mm diam., 150–200 µm high, randomly dispersed across the host thallus. Photobiont absent. Exciple hyaline, thin, entire but poorly developed, 5–8 µm thick, complete. Hymenium hyaline, I+ blue changing slowly to red, 65–80 µm high. Hypothecium hyaline, 18–22 µm high. Asci clavate, *Opegrapha* type, 40–50 × 10–12 µm. Ascospores fusiform, hyaline, ends rounded, 18–19 × 4.0–4.5 µm, 4-celled, penultimate cell usually slightly longer and broader.

Chemistry.—Not investigated.

Etymology.—Species epithet refers to generic name of host thallus.

Distribution and Habitat.—*Enterographa bagliettoae* was collected from a coral limestone outcrop occupying a small gap in the forest. The host species is by far the most common saxicolous lichen in South Florida (Seavey, unpub. data). In Everglades National Park it is photophilous, occupying high ground in exposed prairies. South Florida collections of the genus *Enterographa* also are usually from exposed sites. Thus, it is tempting to hypothesize that the forested collection site for *E. bagliettoae* is a relict population established when the site was far more exposed than at present. If true, further examples of the new lichenicolous species might better be found on outcrops harbouring the host species in more open and exposed locations.

Discussion.—*Enterographa bagliettoa* is currently the only lichenicolous member of the genus using a host from the Verrucariaceae (Lawry and Diederich, 2015). Furthermore, *Enterographa osagensis* C. A. Morse is the single other *Enterographa* appearing on a host using a saxicolous substrate (Morse, 2013). It also has consistently 4-celled ascospores but is lichenicolous on *Bacidina* with smaller ascospores (11–15 µm long). *Enterographa punctata* Ertz and Diederich, known from Sri Lanka, is the sole other lichenicolous *Enterographa* with ascomata forming in gall-like structures presumably formed by the host in response to invasion. It differs by its narrower ascospores, much larger ascomata and a different host (Ertz et al., 2005).

***Enterographa johnsoniae* F. Seavey and J. Seavey, sp. nov.**

Figure 10G–H Mycobank No. 819833

Diagnosis.—Similar to *Enterographa keylargoensis* but differs by its punctiform ascomata arranged in pseudostroma and the presence of norstictic acid.

Type Locality.—U.S.A. Florida. Monroe County: Dagny Johnson Key Largo Hammock Botanical State Park, about .2 kilometers east of State Route 905, 25˚18´ N, 80˚17´ W, corticolous on *Guettarda scabra* along slough margin in mature upland forest, 7 January, 2015.

Holotype.—*Randall 1068*, deposited at USF.

Description.—Thallus corticolous, 1.0–1.5 cm across, green, shiny, verruculose, 175–200 µm thick, discontinuous, margins effuse, ecorticate, but with a thin epinecral layer, 5–10 µm thick. Medullary layer extremely variable, 5–75 µm thick. Photobiont *Trentepohlia*. Ascomata punctiform to very short lirellate, 0.07–0.25 mm long, immersed in raised brownish, weakly pseudostromatic tissue, up to 0.30 mm wide; disc brown. Exciple weakly developed, yellowish, entire but thining at the base, 5–10 µm wide. Hypothecium hyaline, 20–25 µm high. Hymenium hyaline, 80–100 µm high, I+ red. Asci clavate, *Opegrapha* type, 60–65 × 14–18 µm. Ascospores fusiform, often with one end narrowing significantly and becoming acicular, 48–56 × 5.5–6.0 µm, 16–20-locular, perispore < 1 µm. Pycnidia not detected.

Distribution and Habitat.—*Enterographa johnsoniae* was collected just once from an ecotone between the most well-developed arboreal part of the hammock forest and an exposed slough margin. However, the slough and its arboreal composition were not part of this foray. Therefore, the species may be more common than currently indicated.

Chemistry.—Thallus K+ red, C–, P+ orange. TLC: norstictic acid.

Etymology.—The name commemorates the untiring efforts of Dagny Johnson who was instrumental in halting an in-progress residential development in a large section of the current state park. The park is named in her honor.

Discussion.—Both the sympatric *Enterographa quassiicola* Fée and *E. subquassiaecola* Cáceres and Lücking, described from Brazil, have similar pseudostromatic ascomata and norstictic acid. But ascospores of each are considerably smaller and always with fewer than 12 locules. Worldwide, *Enterographa inthanonensis* Sparrius is the only other *Enterographa* with the same chemical and ascomatal characters as the new species but its ascospores are consistently 4-locular (Sparrius, 2004).

Enterographa keylargoensis F. Seavey and J. Seavey, sp. nov.

Figure 11A–D Mycobank No. 819834

Diagnosis.—Similar to *Enterographa caudata* and *Enterographa murrayana* but differing by its ascomatal structure, ascospores with greater septation, and lacking secondary chemistry.

Type Locality.—U.S.A. Florida. Monroe County: Dagny Johnson Key Largo Hammock Botanical State Park, 25°18′ N, 80°17′ W, about .5 kilometers east of State Route 905, corticolous on *Ocotea coriacea* in mature upland forest, 7 January, 2015.

Holotype.—*Randall 1070*, deposited at USF.

Description.—Thallus corticolous, ecorticate but with epinecral layer 10–20 µm thick, continuous, margins effuse, 1–2 cm across, smooth, 100–125 µm thick, green to dark green, matte, hydrophobic. Separate medullary layer absent; the hyphae instead interspersed with *Trentepohlia* photobiont. Ascomata lirelliform, 0.50–1.30 mm long, immersed, often margined by non-stromatic white thalline patches; disc brown. Exciple weakly developed, clear to yellow-brown, entire, or sometimes lacking at the base, 5–10 µm wide. Hypothecium hyaline, 20–30 µm high. Hymenium hyaline, 80–100 µm high, I+ red. Asci clavate, *Opegrapha* type, 60–75 × 18–24 µm. Ascospores fusiform, ends blunt, rounded, 50–54 × 5.0–5.2 µm, 15–19-locular, perispore c. 4 µm. Pycnidia not detected.

Chemistry.—Thallus K–, C–, P–. TLC: no substances.

Etymology.—The specific epithet refers to the collection locale, i.e., Key Largo, Florida.

Distribution and Habitat.—*Enterographa keylargoensis* was common on a variety of tree species in the most mature arboreal part of the state park. *Krugiodendron ferreum, Eugenia foetida,* and *Ocotea coriacea* were common corticolous substrates. The collection habitat features filtered sunlight in moderate shade.

Discussion.—The only other North American *Enterographa* with such large multilocular ascospores are the recently described *Enterographa caudata* Seavey and Seavey and *Enterographa murrayana* Seavey and Seavey, but both have different chemistries; the former schizopeltic acid and lichexanthone, and the latter gyrophoric acid (Seavey and Seavey, 2014). Furthermore, they both lack lirelliform ascomatal structures. *Enterographa multilocularis* (Müll. Arg.) Sparrius, known from Brazil and the West Indies, has similar size and loculate ascospores, but unlike *Enterographa keylargoensis,* an algal free medullary zone, and a different chemistry of confluentic acid and traces of psoromic acid. *Enterographa quassiicola* Fée is superficially similar to this new species, but

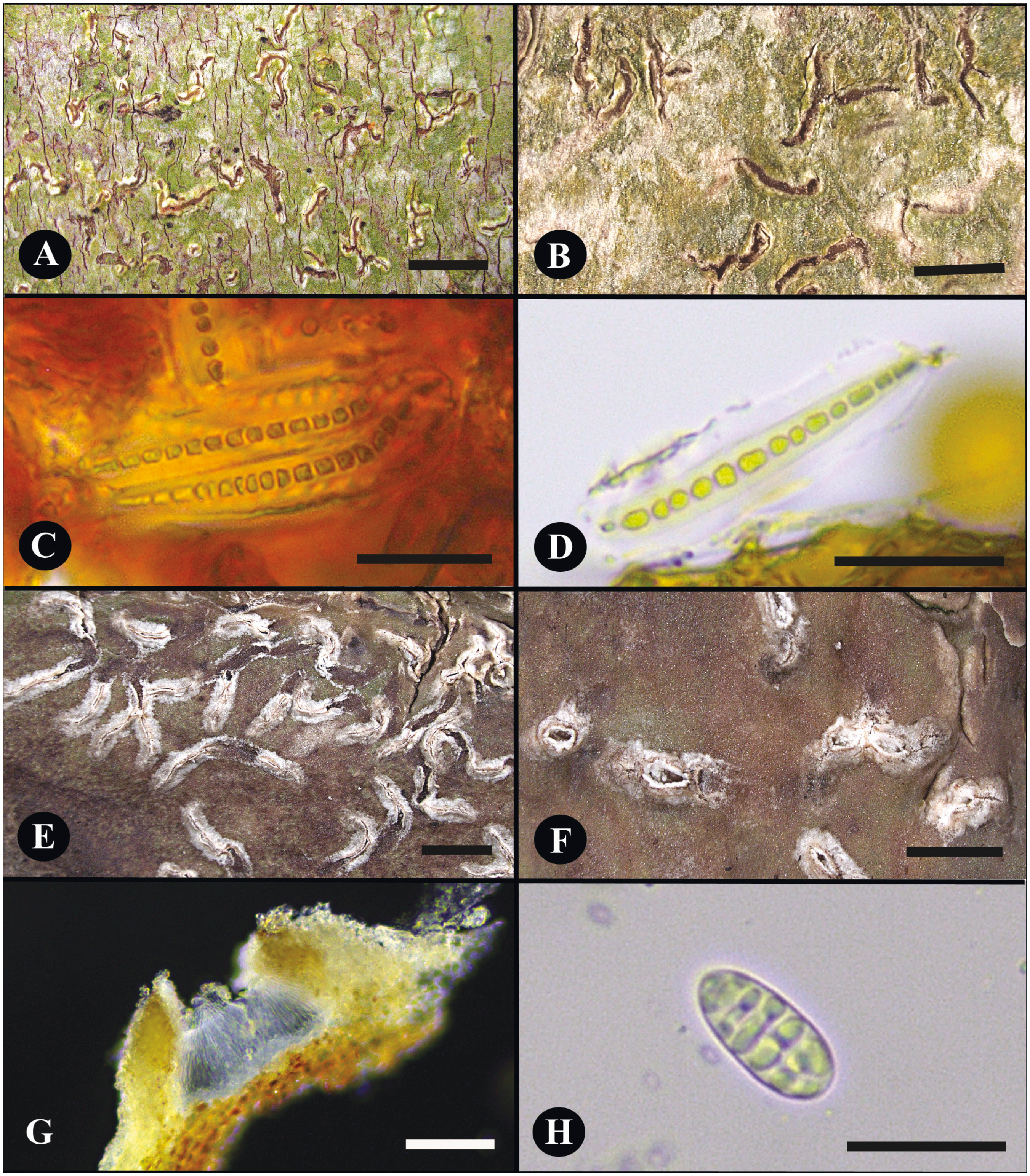

Figure 11. A–D, *Enterographa keylargoensis.* **A–B,** Habitus. **C–D,** Ascospores. **E–H,** *Fissurina albolabiata*. **E–F,** Habitus. **G,** Thin section with uncarbonized exciple. **H,** Ascospore. Scales. A, B and E = 1 mm. C and D = 25 µm. F = 2 mm. H = 20 µm. G = 50 µm.

has smaller ascospores with fewer locules and ascomata in pseudostromatic tissue which may contain norstictic acid (Sparrius, 2004).

Additional Specimens Examined.—U.S.A. Florida. Monroe County: Dagny Johnson Key Largo Hammock Botanical State Park, *Randall 1031*, corticolous on *Hypelate trifoliata* in well shaded upland forest; *Randall 1074*, corticolous on *Ocotea coriacea* in mature upland forest; *Seavey and Seavey 15109*, corticolous on *Eugenia axillaris* in mature upland forest.

Fissurina albolabiata **F. Seavey and J. Seavey, sp. nov.**

Figure 11E–H Mycobank No. 819835

Diagnosis.—Similar to *Fissurina elaiocarpa* but differing by its smaller non-amyloid ascospores and lirellae structure.

Type Locality.—U.S.A. Florida. Monroe County: Dagny Johnson Key Largo Hammock Botanical State Park, about .5 kilometers southeast of State Route 905, 25˚16´ N, 80˚17´ W, corticolous on *Krugiodendron ferreum* in mature upland forest, 7 January 2015.

Holotype.—*Randall 1101*, deposited at USF.

Description.—Thallus corticolous, 1–3 cm wide, smooth, waxy, dark brownish green, ecorticate, but with an epidermal layer of small crystals interwoven with hyphae, 5–20 µm thick. Photobiont *Trentepohlia*. Ascomata lirelliform, erumpent/fissurine, endoperidermal, becoming labiate and gaping with age, straight to curved, partly short-branched, 1–3 × 0.10–0.25 mm. Labia conspicuous, thickened and eroding, then exhibiting a white, frayed thalline margin of medullary hyphae. Disc eventually exposed, usually with a thick, white pruina. Exciple brownish yellow laterally, 8–15 µm wide, disappearing into bark cells of the host basally. Hymenium hyaline, 55–75 µm high. Hypothecium hyaline to pale yellow, 8–13 µm high. Epihymenium granulose, 4–8 µm high. Paraphyses apically spinulose, ca. 1.5 µm wide. Periphysoids present, apically spinulose, 8–13 µm long. Asci 8-spored, clavate, 55–65 µm long. Ascospores hyaline, submuriform to muriform, 16–19 × 8–9 µm, non-amyloid. Pycnidia not detected.

Chemistry.—Thallus K–, C–, P–. TLC: no substances.

Etymologly.—Epithet refers to the distinctive white margined labia of the ascomata.

Distribution and Habitat.—This species was abundant in the more mature section of the park, occurring on a variety of smooth-barked trees. It was not found in any other sampled habitat.

Discussion.—The ascomata of the new species are erumpent/fissurine, becoming labiate and gaping. It is conspicuous in the field due to its bright white-margined ascomata on a dark thallus. *Fissurina elaiocarpa* (Archer) Archer, known from Australasia, shares many of the characteristics of *F. albolabiata* but has larger amyloid ascospores, 20–28 × 13–18 µm. The ascospores of *Fissurina* aff. *elaiocarpa*, a scanty undescribed collection from Fakahatchee Strand Preserve State Park in southwest Florida, also has non-amyloid ascospores; but differs by its verruculose thallus, larger ascospores, and the lack of the conspicuous white on dark ascomatal characteristic (Lücking et al., 2011). *Fissurina subcomparimuralis* Common and Lücking differs by its fissurine blackish ascomata and a carbonized exciple (Lumsch et al., 2011). In addition its ascospores are somewhat longer and narrower on average. *Fissurina instabilis* (Nyl.) Nyl. shares some of the traits of the new species but has longer and wider amyloid ascospores (17–24 × 10–15 µm) and a verrucose-bullate thallus unlike the new species.

Additional Specimens Examined.—U.S.A. Florida. Monroe Co.: Dagny Johnson Key Largo Hammock Botanical State Park, *Kaminsky DJ041*, in mature upland forest corticolous on *Gymnanthes lucida*; *Randall 1069*, corticolous on *Ocotea coriacea* in mature upland forest; *Seavey* and *Seavey 15364*, corticolous on *Krugiodendron ferreum* in mature upland forest.

Fissurina incisura **F. Seavey and J. Seavey, sp. nov.**

Figure 12A–C Mycobank No. 819836

Diagnosis.—Similar to *Fissurina subcomparimuralis* but differing by having larger ascospores, an ecorticate thallus and a different lirella structure.

Type Locality.—U.S.A. Florida. Monroe

County: Dagny Johnson Key Largo Hammock Botanical State Park, about .5 kilometer east of State Route 905, 25°16′ N, 80°18′ W, corticolous on *Sideroxylon salicifolia* in exposed open woodland, 7 January 2015.

Holotype.—*Seavey and Seavey 15027*, deposited at USF.

Description.—Thallus corticolous, pale greenish gray, smooth, matte, ecorticate, continuous, 3.5 cm diam., 230–260 µm thick, margins effuse. Thallus, in section with irregular crystals, the larger arranged above the homoiomerous algal layer, 5–25 µm thick. Photobiont *Trentepolia*. Lirellae immersed, fissurine, thin, straight to serpentine, mostly unbranched, 1–3 × 0.04–0.06 mm, disc concealed, labia inconspicuous, covered by a complete thalline margin whiter than the thallus. Excipulum entire, apically carbonized, pale yellow-brown laterally and basally, 0.15–0.25 µm wide. Epihymenium hyaline, 10–15 µm high, ecrystallate. Hymenium hyaline, not inspersed, 90–110 µm high. Hypothecium hyaline, barely detectable, c. 10 µm high. Periphysoids present, slightly spinulose at tips, 8–12 µm long. Asci 8-spored, 70–85 × 20–25 µm. Ascospores hyaline, muriform, 27–37 × 10.5–14.0 µm, 6–8 × 3–4-locular, non-amyloid. Perispore not detected. Pycnidia not detected.

Chemistry.—No substances.

Etymolgly.—The epithet refers to the slit-like ascomata.

Distribution and Habitat.—*Fissurina incisura* is known only from eight collections at Dagny Johnson Key Largo Hammock Botanical State Park in Florida. All collections originated from a former pineland now occupied by broad leaf tree species in an early stage of recovery. Most collections were in locations receiving nearly full sun.

Discussion.—The new species can be identified by the combination of an apically carbonized exciple, immersed, fissurine, non-gaping lirellate structure, and muriform non-amyloid ascospores. In our non-published world key to the genus, *Fissurina subcomparimuralis* Common and Lücking is closest to the new species and was also found at Dagny. However, it possesses smaller ascospores (15–25 × 6–8 µm), brownish black entire excipula and blister-like blackish fissurine ascomata. *Fissurina nigrolabiata* Rivas Plata, Bawingan and Lücking, described from the Philippines, differs by having thick complete excipular carbonization and smaller ascospores (12–17 × 5–8 µm.). *Fissurina cingalina* (Nyl.) Staiger is also known in the immediate area but lacks excipular carbonization and has broader ascospores often with wide perispores up to 5 µm (Staiger, 2002).

Additional Specimens Examined.—U.S.A. Florida. Monroe County: Dagny Johnson Key Largo Hammock Botanical State Park, *Seavey and Seavey 15380, 15444* corticolous on *Manilkara bahamensis* at exposed lowland forest margin; *Seavey and Seavey 15336* corticolous on *Eugenia foetida* in unorganized open woodland; *Seavey and Seavey 15304* corticolous on *Reynosia septentrionalis* in open woodland among shrubs and trees.

***Graphis ferrugineodisca* F. Seavey and J. Seavey, sp. nov.**
Figure 12D–E Mycobank No. 819837

Diagnosis.—Similar to *Graphis nanodes* but ascospores larger, more densely muriform, and disc exposed with reddish brown pruina.

Type Locality.—U.S.A. Florida. Monroe County: Dagny Johnson Key Largo Hammock Botanical State Park, .7 kilometers east of the junction of State Route 905 and Card Sound Road, 25°17′ N, 80°17′ W, corticolous on *Ficus aurea* in exposed open woodland, 8 January 2015.

Holotype.—*Seavey and Seavey 15298,* deposited at USF.

Isotype.—*Seavey and Seavey 15300,* deposited at Seavey hb.

Description.—Thallus corticolous, pale gray, smooth, matte, thinly corticate, continuous, 3 cm diam., 150–230 µm thick, with widely dispersed crystals in cortex and photobiont layer up to 25 µm diam. Photobiont *Trentepohlia*. Ascomata lirelliform, erumpent, with lateral thalline cover, flexuous, unbranched, 1.0–2.5 × 0.10–0.35 mm, labia entire. Disc reddish brown, opening broadly with age. Excipulm carbonized laterally, often to

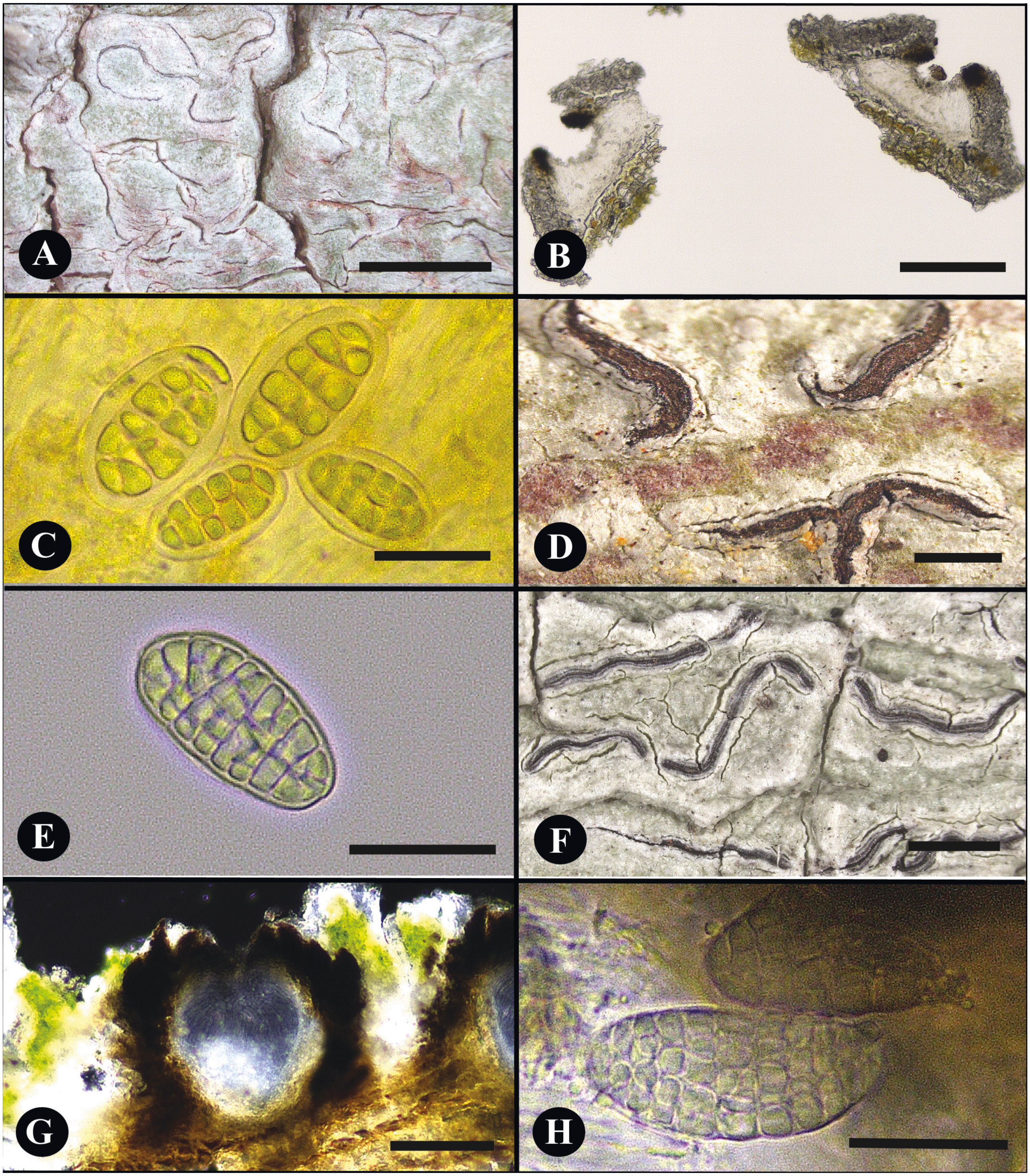

Figure 12. A–C, *Fissurina incisura*. **A,** Habitus. **B,** Thin section with distinct apical carbonization. **C,** Ascospores. **D–E,** *Graphis ferrugineodisca.* **D,** Habitus. **E,** Ascospore. **F–H,** *Graphis koltermaniae*. **F,** Habitus. **G,** Thin section with excipular lateral striate carbonization. **H,** Ascospores. Scales. A = 2 mm. B = 200 µm. C and E = 20 µm. D and F = 1 mm. G = 100 µm. H = 20 µm.

the substrate. Epihymenium pale brown, 5–10 µm high, overlain by a thick reddish brown granulose layer up to 30 µm thick. Hymenium hyaline, not inspersed, 80–100 µm high. Hypothecium hyaline, 18–23 µm high. Paraphyses unbranched. Asci clavate, 1-2-spored, 65–80 × 14–19 µm. Ascospores hyaline, densely muriform, I+ purplish brown, 28–39 × 14–18 (20) µm.

Chemistry.—Thallus K–, C–, P–. TLC: no substances.

Etymologly.—The name refers to the reddish brown discs of the new species.

Distribution and Habitat.—*Graphis ferrugineodisca* appears to be photophilous as all collection sites are from open areas in full sun within a copse of short trees and shrubs with no dominate woody species. The habitat is a transition zone between taller more organized broad leaf trees and a nearly monotypic *Conocarpus* dominated site.

Discussion.—Ascomata of this new species change markedly as they mature. Early in their development lirellae appear as typical *Graphis*, with well-developed labia and slightly open discs revealing the reddish brown pruina. However, as they mature, discs become exceptionally exposed, more vividly colored with receding labia, resulting in a close resemblance to *Phaeographis* Müll. Arg. or *Platygramme* Fée. In some sections, the epihymenium emits a purple effusion in K but this was not a consistent trait since the epihymenium of many lirellae did not react. Among other *Graphis*, the pantropical *Graphis nanodes* Vain. shares the same labia, inspersion, carbonization, ascospore septation (muriform), and mostly unbranched lirellae with lateral thalline margins (*lineola* morph) (Lücking et al., 2009). However, the discs of that species are closed and lack the reddish brown pruina. In addition, ascospores are much narrower (7–11 µm versus 14–20 µm) and less densely muriform while asci are 8-spored as opposed to 1–2 spored in the new species. Sympatrically, *G. xylophaga* (R. C. Harris) Lendemer is closest to the new species but has closed discs, much larger ascospores (65–90 × 20–30 µm), and a different aspect (*subserpentina* morph) (Lücking et al., 2009).

Additional Specimen Examined.—*Seavey and Seavey 15301*, (FSU) corticolous on *Ficus aurea* in exposed lowland among widely spaced trees and shrubs.

Graphis koltermaniae F. Seavey and J. Seavey, sp. nov.

Figure 12F–H Mycobank No. 819838

Diagnosis.—Similar to *Graphis neoelongata* but lirellae unbranched with complete thalline cover and asci containing only two ascospores.

Type Locality.—U.S.A. Florida. Monroe County: Dagny Johnson Key Largo Hammock Botanical State Park, .5 kilometers east of the junction of State Route 905 and Card Sound Road, 25°17′ N, 80°17′ W, corticolous on dead tree among widely spaced shrubs in exposed lowland, 8 January 2015.

Holotype.—*Seavey and Seavey 15416*, deposited at USF.

Description.—Thallus corticolous, gray-green, slightly shiny, corticate, epiphoeodal, continuous, 2–3 cm diam., 250–400 µm thick, ecrystallate. Photobiont *Trentepohlia.* Ascomata lirelliform, flexuous, unbranched, 0.80–1.60 × 0.14–0.17 mm. Labia striate with thin complete thalline cover. Disc closed. Exciple laterally carbonized. Epihymenium barely visible, <10 µm high. Hymenium hyaline, not inspersed, 90–115 µm high. Hypothecium hyaline, 22–27 µm high. Paraphyses unbranched. Asci clavate, 75–90 × 14–16 µm, (1) 2-spored. Ascospores hyaline, muriform, I+ purple, 40–48 × 14–19 µm, 10–12 × 4–6-locular.

Chemistry.—Thallus K+ red, C–, P+ orange. TLC: norstictic acid.

Etymology.—Dedicated to Susan Kolterman of Key Largo, Florida for her hundreds of volunteer hours devoted to the rehabilitation of Dagny Johnson Key Largo Hammock Botanical State Park, her organizational skills, and her self-taught botanical knowledge of the area which aided this lichen inventory greatly.

Distribution and Habitat.—The new species was collected twice from a poorly developed area of thinly populated short trees and shrubs. It receives direct midday sun and is moderately hydrophobic.

Discussion.—*Graphis neoelongata* Lücking, also known from South Florida, is close to the new species but has much longer, stellately branched lirellae with lateral thalline margins (Seavey and Seavey, 2011b). In addition, the asci are more than two spored. *Graphis hodgesiana* Lendemer and *Graphis tamiamiensis* Lendemer, both more or less sympatric taxa, share many of the same traits with the new species but have associated anthraquinones that react K+ purplish (Lendemer 2010). Furthermore, the former has larger ascospores (50–70 µm) while those of the latter are submuriform and markedly smaller (20–35 µm) than the new species.

Additional Specimen Examined.—*Seavey and Seavey 15382,* corticolous on *Eugenia foetida* in exposed shrubby lowland.

***Leiorreuma erodens* F. Seavey and J. Seavey, sp. nov.**

Figure 13A–B Mycobank No. 819839

Diagnosis.—Similar to *Leiorreuma sericeum* but ascospores larger and 4–6-locular.

Type Locality.—U.S.A. Florida. Monroe County: Dagny Johnson Key Largo Hammock Botanical State Park, about .35 kilometers east of State Route 905, 25˚18´ N, 80˚17´ W, corticolous on *Lysiloma latisiliquum,* 7 January 2015.

Holotype.—*Seavey and Seavey 15107*, deposited at USF.

Isotype—*Seavey and Seavey 15521*, deposited at Seavey hb.

Description.—Thallus verrucose to bullate, corticate, 200–300 µm thick, gray-green at first but large portions of the thallus white, ecorticate, and granular due to cortical erosion. Photobiont *Trentepohlia.* Medulla white, with clear crystals 8–15 µm diam. Lirellae stellately branched, 1–4 × 0.14–0.18 mm. Disc open, brown, lightly white pruinose. Excipula brown and thin laterally, thickly carbonized basally. Hypothecium clear, 25–40 µm high. Hymenium inspersed, 100–130 µm high. Asci 8-spored, clavate, 55–65 × 15–19 µm. Ascospores brown, oblong, 21–27 × 6–7 µm, 4–6-celled.

Chemistry.—Thallus K–, C–, P–. TLC: no substances.

Etymolgly.—Epithet refers to the extensive granular eroded areas in the thallus.

Distribution and Habitat.—*Leiorreuma erodens* was found along a sunny road margin. There were presumed to be several individual specimens of this species on the same tree but only two collections were made which were deemed to be suitable as voucher specimens. See discussion below.

Discussion.—Several white, lichenized, sterile, granular patches were observed close to the new species and may be the same taxon in an highly eroded state. No parasitism or herbivory could be detected and there would seem to be no competitive advantage for the lichen to self-promote this trait. Thus, it is possible the granular white patches represent a senescent stage of the new species, perhaps due to a photosynthesis/respiration imbalance. If true, the species epithet chosen may be inappropriate as it might not represent a consistent trait. But since the identification of the white patches is extremely tentative and the term "erodens" is singularly descriptive of the fertile new species as currently known, we prefer to leave it in place. The new species is somewhat similar to the sympatric *L. sericeum* (Eschw.) Staiger but has larger 4–6-celled ascospores rather than those which are consistently 4-celled of the latter.

***Phaeographis pseudostromatica* F. Seavey and J. Seavey, sp. nov.**

Figure 13C–D Mycobank No. 819840

Diagnosis.—Similar to *Phaeographis quadrifera* but lirellae arranged in white pseudostromata.

Type Locality.—U.S.A. Florida. Monroe County: Dagny Johnson Key Largo Hammock Botanical State Park, near Purplewing Trail east of State Route 905, 25˚16´ N, 80˚18´ W, corticolous on *Jacquinia keyense* in mature upland forest*,* 7 January 2015.

Holotype.—*Seavey and Seavey 15111*, deposited at USF.

Description.—Thallus corticolous, corticate, brownish gray, bullate, shiny, waxy, indurated, continuous, 2 cm diam., 140–200 µm thick. Cortex inspersed with small granules, algal layer with oxalate crystals to 5 µm diam. Photobiont

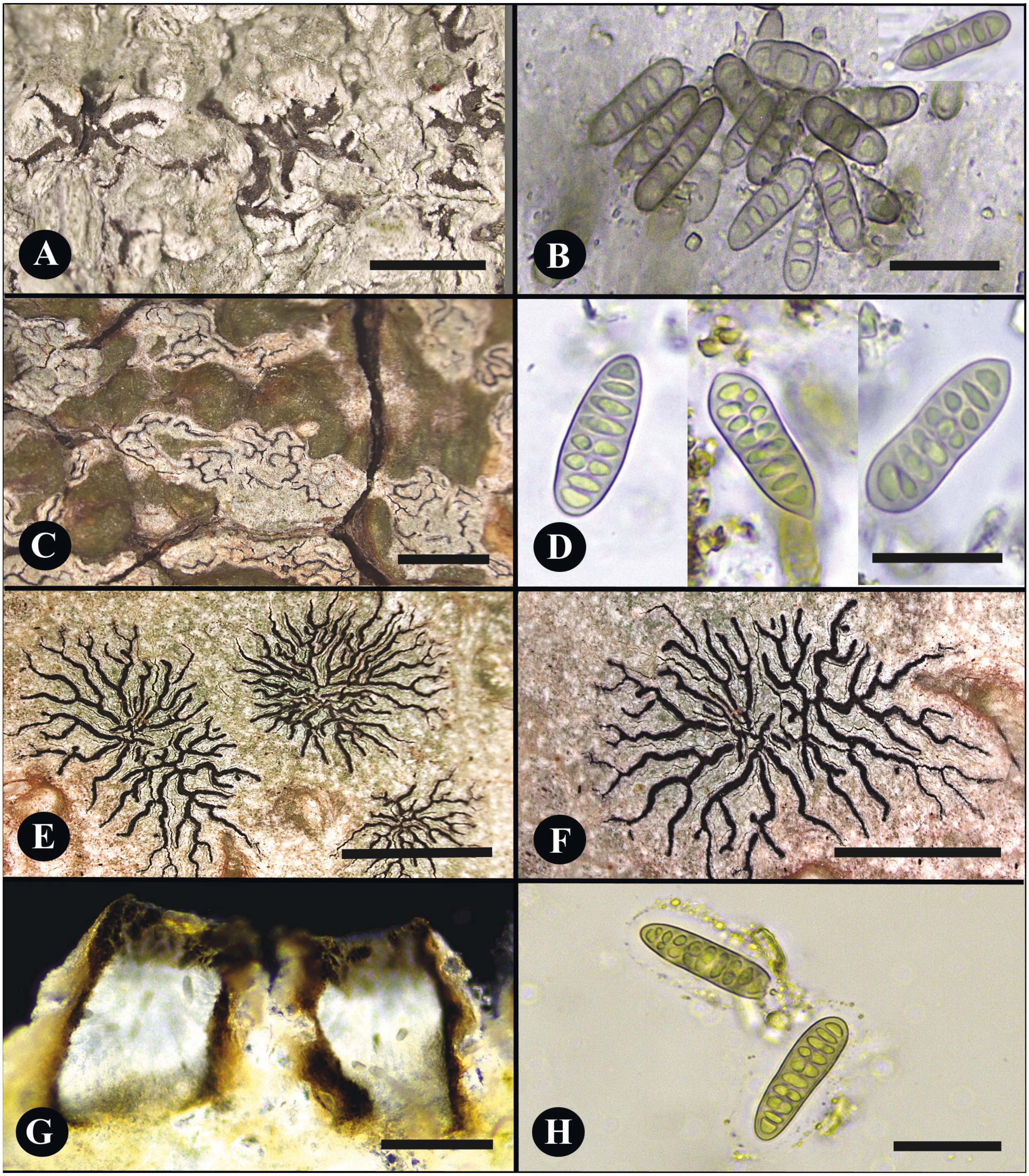

Figure 13. A–B, *Leiorreuma erodens*. **A,** Habitus. **B,** Ascospores. **C–D,** *Phaeographis pseudostromatica*. **C,** Habitus. **D,** Ascospores. **E–H,** *Phaeographis radiata*. **E–F,** Habitus. **G,** Ascomatal section showing thin lateral excipular carbonization. **H,** Ascospores. Scales. A = 3 mm. B, D and H = 20 µm. C = 5 µm. E = 2 mm. F = 1 mm. G = 50 µm.

Trentepohlia. Ascomata lirelliform, thin, brownish black, 0.80–1.50 × 0.08–0.10 µm, immersed to erumpent, partly branched, arranged in broad confluent pseudostromatic areas. Disc partially open, black, epruinose. Exciple brown, laterally 12–15 µm wide, slightly thickened apically, 20–25 µm wide. Hymenium hyaline, inspersed, 70–90 µm high. Hypothecium hyaline, 15–20 µm high. Epihymenium brown, 12–15 µm high. Asci clavate, 4–8-spored, 60–75 × 14–18 µm. Ascospores brown, submuriform to muriform, 20–30 × 7–10 µm.

Chemistry.—Thallus K+ red, C–, P+ orange. TLC: norstictic acid.

Etymolology.—Species name refers to the lirellae arranged in pseudostromatic tissue.

Distribution and Habitat.—The new species is known from two collections from a former pineland in nearly full sun among short, widely dispersed arboreal species.

Discussion.—*Phaeographis pseudostromatica* is similar to the sympatric *Phaeographis quadrifera* (Nyl.) Staiger also found during the foray. It differs primarily in its lirellae arrangment in pseudostromal tissue. *Phaeographis nylanderi* (Vain.) Zahlbr. also present and abundant, differs by its inspersed hymenia, the presence of norstictic acid, transversely septate ascospores, and the absence of pseudostromata.

Additional Specimens Examined.—*Seavey and Seavey 15289*, corticolous on *Jacquinia keyense* in mature upland forest.

Phaeographis radiata **F. Seavey and J. Seavey, sp. nov.**

Figure 13E–H Mycobank No. 819841

Diagnosis.—Similar to *Phaeographis fusca* but exciple laterally carbonized, ascospores submuriform, and lirellae long, radially branched.

Type Locality.—U.S.A. Florida. Monroe County: Dagny Johnson Key Largo Hammock Botanical State Park, 1.3 km east of junction of State Road 905 and Card Sound Road, 25˚17′ N, 80˚17′ W, corticolous on *Ficus aurea* in lowland part of second growth forest. 8 January 2015.

Holotype.—*Randall 1037*, deposited at USF.

Description.—Thallus corticolous, corticate, pale brown to greenish brown, dull, uneven, continuous, 3–4 cm diam., 300–440 µm thick. Cortex inspersed with small angular crystals to about 10 µm diam. Medullary layer with rectangular crystals 10–25 µm diam., algal layer homoiomerous. Photobiont *Trentepohlia.* Ascomata lirelliform, brown, radially and richly branched, 3.0–7.0 × 0.10–0.13 µm. Disc exposed, brown, epruinose. Excipula carbonized laterally, 12–30 µm wide. Hymenium hyaline, inspersed, 100–125 µm high. Hypothecium hyaline, 25–35 µm high. Epihymenium brown, 12–15 µm high. Paraphyses 1.8–2.0 µm wide, tips branching and nodular. Asci clavate, 8-spored, 65–80 × 15–18 µm. Ascospores brown, submuriform to muriform, 30–40 × 12–14 µm.

Chemistry.—Thallus K+ red, C–, P+ orange. TLC: norstictic acid.

Etymology.—Species name refers to the distinctive radially branched lirellae.

Distribution and Habitat.—This new species is represented by a sole collection found in an even-aged early successional forest at the margin of a large shallow depression flooded during the rainy season. The depression acted as a small light gap permitting abundant sunlight to the collection site.

Discussion.—*Phaeographis radiata* is similar in appearance to some forms of *Phaeographis dendritica* Müll. Arg. which differs by its transversely septate ascospores and completely carbonized excipula (Staiger, 2002). *Platygramme pachnodes* (Fèe) E. Tripp and Lendemer has inspersed hymenia, norstictic acid, and muriform ascospores, but lacks the radially branched lirellae, and also differs by its convergent labia and an exciple exhibiting thick apical wedged-shaped carbonization (Tripp and Lendemer, 2010). Other North American species with inspersed hymenia, muriform ascospores, and containing norstictic acid include *Phaeographis smithii* (Leighton) B. de Lesd. and *Phaeographis nylanderi* (Vainio) Zahlbr.; both differing by having transversely septate ascospores. *Phaeographis atromaculata* (A. W. Archer) A. W. Archer, also with some shared traits of the new species, differs by its much larger ascospores (100–135 µm long). Among Neotropical taxa, *Phaeographis alcicornis* Redinger has smaller ascospores, a clear hymenium, and contains stictic acid, in addition to norstictic acid. A key to the species of North American *Phaeographis* is provided below.

Platygramme elegantula **F. Seavey and J. Seavey, sp. nov.**
Figure 14A–C Mycobank No. 819842

Diagnosis.—Similar to *Platygramme arechavaletae* but differing by ascospore septation and thallus containing norstictic acid.

Type Locality.—U.S.A. Florida. Monroe County: Dagny Johnson Key Largo Hammock Botanical State Park about .5 kilometers south of State Route 905. 25˚16´ N, 80˚18´ W, corticolous on *Pithecellobium keyense* along slough margin, 8 January 2015.

Holotype.—*Seavey and Seavey 15110*, deposited at USF.

Description.—Thallus corticolous, pale gray, 2 cm diam., 150–190 µm thick, corticate, continuous, smooth to uneven, matte, fissured, margins effuse. Thallus in section with scattered irregular crystals, 20–30 µm diam. Photobiont *Trentepohlia.* Lirellae black, *Graphis*-like, erumpent with thick lateral thalline margin, flexuous, unbranched, 0.5–1.5 × 0.14–0.18 mm, disc concealed, labia entire, convergent, thinly pruinose. Excipula with thick lateral carbonization, 40–75 µm wide. Epihymenium pale brown, 15–20 µm high, ecrystallate. Hymenium hyaline, densely inspersed, 125–155 µm high. Hypothecium hyaline above, pale brown below, 40–50 µm high. Asci 8-spored, 65–80 × 16–22 µm. Ascospores brown, muriform, 29–34 × 11–14 µm, 8 × 2–4-locular, I+ red-brown. Pycnidia not detected.

Chemistry.—Thallus K+ red, C−, P+ orange. TLC: norstictic acid.

Etymology.—Species epithet refers to the handsome nature of the dark lirellae on white thallus.

Distribution and Habitat.—The new species is known from a single collection obtained at the edge of a brackish slough in nearly full sunlight.

Discussion.—*Platygramme elegantula* can be identified by its *Graphis*-like lirellae with thick lateral thalline margins, closed discs, brown muriform ascospores, and the presence of norstictic acid. It is close to *Platygramme arechavaletae* (Archer) Archer that differs by lirellae with thin thalline margins and open discs. In addition the ascospores have fewer septa and the thallus lacks substances. The sympatric *Platygramme pachnodes* E. Tripp and Lendemer also has norstictic acid but its lirellae have open, pruinose discs, a basal thalline margin and excipula with wedge-shaped apical carbonization (Tripp and Lendemer, 2010). The pantropical species *Platygramme caesiopruinosa* (Fée) Fée normally lacks lateral excipular carbonization and is devoid of secondary substances while ascospores are much larger, measuring 75–110 × 17–30 µm (Staiger, 2002).

Ramalina ramificans **F. Seavey and J. Seavey, sp. nov.**
Figure 14D–F Mycobank No. 819843

Diagnosis.—Similar to *Ramalina complanata* but differing by main branches having flattened dichotomously forked side branchlets, often sorediate at tips, and apothecia with similar marginal outgrowths whose tips end in white papillae.

Type Locality.—U.S.A. Florida. Monroe County: Dagny Johnson Key Largo Hammock Botanical State Park about .9 kilometers east of Crocodile Lake, 25˚17´ N, 80˚17´ W, corticolous on *Conocarpus erectus* in open shrubby lowland, 8 January 2015.

Holotype.—*Seavey and Seavey 15337*, deposited at USF.

Description.—Thallus pale grayish green, fruticose, shrubby, stiff, 3–4 cm long. Branches compressed, canaliculate, papillate along the margins, 1.0–1.5 mm wide, each main branch producing flattened dichotomously branched side protrusions with multi forked tips up to 4.5 mm long, the tips often eroding and becoming sorediate. Apothecia common, terminal, rarely lateral, reverse side smooth, non-papillate, 2–3 mm diam.; margins with multiple flattened multi-forked projections, 1–4 mm, most tips ending in a white papilla. Disc cream-white, smooth, matte. Asci 8-spored, 40–50 × 12–15 µm. Ascospores hyaline, 2-celled, ellipsoid to narrowly ellipsoid,

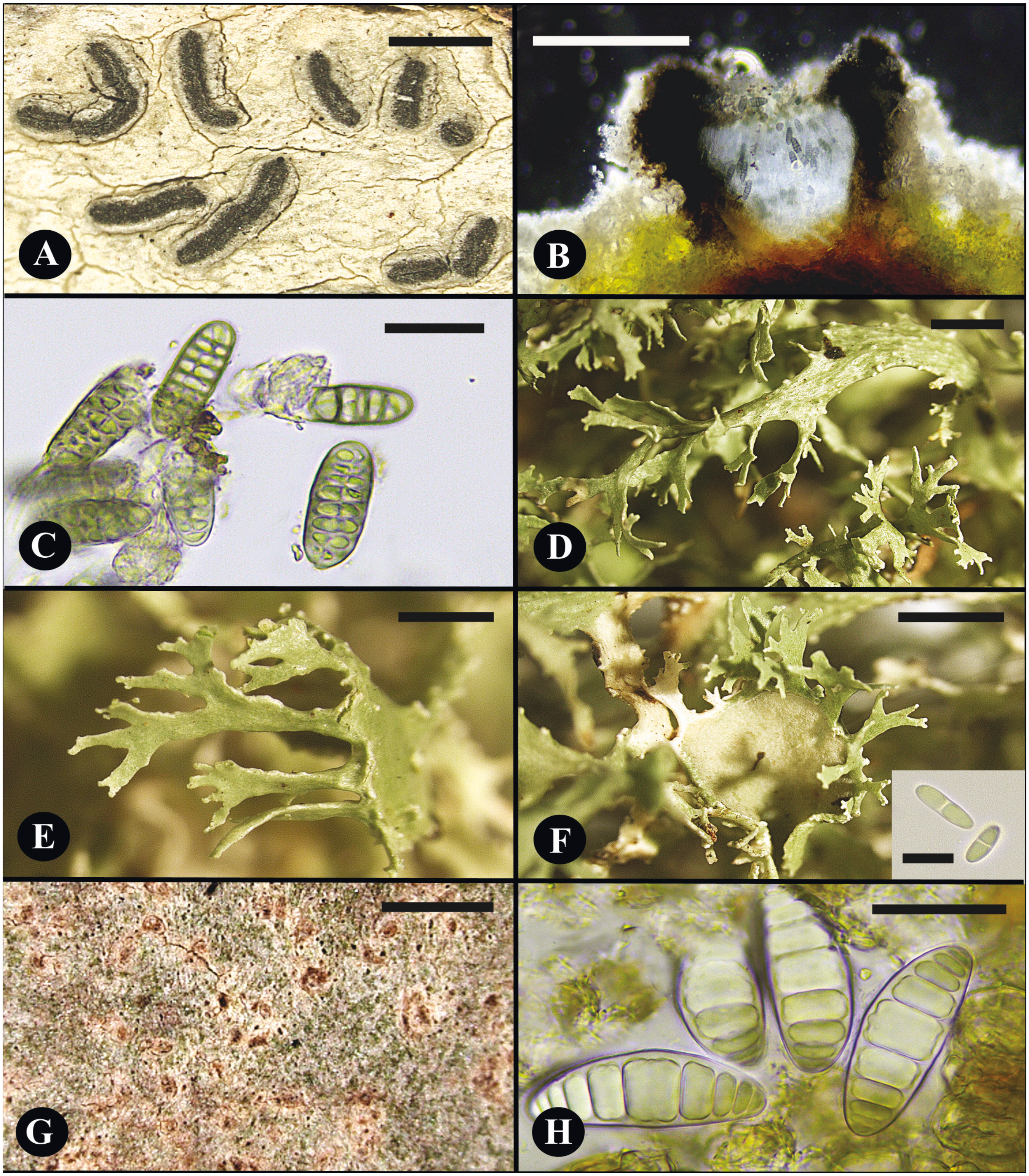

Figure 14. A–C, *Platygramme elegantula*. **A,** Habitus. **B,** Thin section with thick apical and partial lateral excipular carbonization. C, Ascospores. **D–F,** *Ramalina ramificans*. **D,** Branch with compressed dichotomously branching lateral innovations. **E,** Side view of apothecia margin with long dichotomous branchlets. **F,** Top view of apothecia with peculiar marginal projections. Ascospores shown in insert lower right. **G–H,** *Stirtonia divaricatica*. **G,** Habitus. **H,** Ascospores. Scales. A = 1 mm. B = 100 μm. C = 20 μm. D and E = 2 mm. F = 3 mm. Insert = 10 μm. G = 0.5 mm. H = 40 μm.

12–17 × 4.5–5.5 µm.

Chemistry.—Thallus K+ red, C–, P+ orange. TLC: salazinic acid, trace usnic acid.

Etymologly.—Species name refers to the peculiar branched protrusions on the apothecial margins and the side branching emanating from the main branches.

Distribution and Habitat.—*Ramalina ramificans* was encountered at the edge of a saline slough attached to dead branches of *Conocarpus erectus* in harsh full sun. The area is a transition zone between a former pine forest (now a pioneering broad leaf habitat) and a stand of *Rhizophora mangle.*

Discussion.—The new species is similar to *Ramalina complanata* (Sw.) Ach. Both have marginal papillae and at least one of the chemotypes of *R. complanata* contains salazinic acid (Kashiwadani and Kalb 1993), although some authors assign this chemotype to *Ramalina denticulata* Nyl. (Landrón, 1972). But neither is known to have the prolific dichotomous side branches ending in soredia, nor the curious marginal projections of the apothecia found in *R. ramificans*. One could hypothesize that the harsh saline habitat occupied by the new species might account for the drastic morphological differences between the new species and the above mentioned similarities. However, since both *R. complanata* and *R. denticulata* (if one accepts that as a separate species) were collected in the same habitat and conditions (along with other *Ramalina*) and none exhibited any morphological curiosities, this seems extremely unlikely.

***Stirtonia divaricatica* F. Seavey and J. Seavey, sp. nov.**

Figure 14G–H Mycobank No. 819844

Diagnosis.—Similar to *Stirtonia punctiformis* but with narrower ascospores and a thallus containing divaricatic acid.

Type Locality.—U.S.A. Florida. Monroe County: Dagny Johnson Key Largo Hammock Botanical State Park, .2 kilometers east of State Route 905 and 1.7 kilometers north-northeast of the junction of State Route 905 and Card Sound Road, 25˚18′ N, 80˚17′ W, corticolous on *Eugenia foetida* in mature upland forest, 8 January 2015.

Holotype.—*Seavey and Seavey 15198*, deposited at USF.

Description.—Thallus corticolous, pale gray, matte, ecorticate, thin, endophoeodal, continuous, 3–4 cm diam., 60–130 µm thick, ecrystallate. Medullar hyphae scattered throughout thallus but concentrated around the asci, I+ blue. Photobiont *Trentepohlia*, thinly dispersed, often discontinuous, concentrated around asci. Asci either randomly dispersed in white, more or less linear areas formed by algal free hyphal zones or occasionally concentrated in the same areas and then indicated by vague brown spots. Organized ascomata absent. Asci globose, 50–65 µm, 8-spored. Ascospores hyaline, broadly ellipsoid, 63–70 × 24–27 µm, 9–11-celled, mid-cells much larger.

Chemistry.—Thallus K–, C–, P–, UV+ white. TLC: divaricatic acid.

Etymologly.—Species epithet refers to divaricatic acid found in the thallus.

Distribution and Habitat.—The collection site for this new species is within the park's most well-developed section and, therefore, the lowest light level of all habitats sampled. Perhaps coincidentally, this habitat seemed to have a disportionate number of collections containing divaricatic acid (see *Cryptothecia randallii* Seavey and Seavey, sp. nov., this paper).

Discussion.—Aptroot et al. (2014) published a world key to *Stirtonia* A. L. Sm. In that publication *Stirtonia divaricatica* would key out close to *Stirtonia punctiformis* Aptroot and Sipman that has similar but considerably wider ascospores (27–35 µm versus 24–27 µm) and lacks divaricatic acid. The recently described *Stirtonia latispora* F. Seavey and J. Seavey (Seavey and Seavey, 2015), also from Key Largo, has shorter ascospores, well-delimited linear ascigerous zones, and contains no substances. *Stirtonia alboverruca* Makhija and Patw. known from Indian Ocean coastal areas and islands, may be confused with *S. divaricatica* in the absence of TLC analysis as both emit a white color under ultraviolet light. However, *S. alboverruca* has much larger ascospores (85–110 × 40–45) and contains 2'-*O*-methylsuperphyllinic acid (Makhija and Patwardhan, 1998). Since four new species of *Stirtonia* from the Neotropics have been described since the Aptroot key was published, an updated key to the Neotropics is included below.

ANNOTATED CHECKLIST OF LICHENS AND LICHENICOLOUS FUNGI FROM DAGNY JOHNSON KEY LARGO BOTANICAL STATE PARK, KEY LARGO, FLORIDA, 2015

The following list of 323 taxa enumerates collections made during this foray. Wherever possible at least one representative voucher including all type specimens will be deposited at the University of South Florida, Tampa, Florida (USF).

For ease of reference, the following annotated checklist follows the taxonomy of the North American lichen checklist version 21 (Essingler, 2016). Key to symbols: ** species new to science named in this study; * species new to North America (north of Mexico); + species lichenicolous.

Photos of most species may be viewed on the second author's website at: http://www.seaveyfieldguides.com/Lichens/. Photos absent from that website are provided either interspersed with new species descriptions or as supplemental material following literature cited section.

Acanthothecis aurantiaca (Müll. Arg.) Staiger and Kalb.—(*Guccion 2359, Seavey and Seavey 15199, 15373, 15379, 15417, 15478*). This taxon and *Acanthothecis poitaeoides* (M. Wirth and Hale) E. Tripp and Lendemer are superficially identical and differ only by ascospore size (Tripp et al., 2010). In South Florida both have abnormally high concentrations of norstictic acid which occasionally may tint the thallus and/or white labia reddish or orangish. Although Müeller (1885) did not specify the etymology for the epithet, this may have been its source as the Latin *aurantiaca* means orangish.

****Acanthothecis floridensis*** F. Seavey and J. Seavey.—Figure 8A–D. (*Seavey and Seavey 15332*). This new species is described above.

Acanthothecis poitaeoides (M. Wirth and Hale) E. Tripp and Lendemer.—(*Gagnon 2062, 2069, 2099, Kaminsky DJ029, DJ023, Pearson 433, Podaril KL076, KL115, KL158, Randall 1026, Seavey and Seavey 15117, 15284*).

Alyxoria varia (Pers.) Ertz and Tehler Basionym: *Opegrapha varia* Pers.—(*Gagnon 2011, 2153, Kaminsky DJ042*). The molecular work of Ertz and Tehler (2011) resulted in several *Opegrapha* taxa being transferred to other genera. *Opegrapha varia* Pers. was placed in the reinstated genus *Alyxoria* Ach. See also *Zwackia viridis* (Pers. ex Ach.) Poetsch and Schied. below.

Amandinea punctata (Hoffm.) Coppins and Scheid.—(*Gagnon 2007, 2082, Kaminsky DJ100, Podaril KL145, Seavey and Seavey 15085*).

Anisomeridium albisedum (Nyl.) R. C. Harris.—(*Gagnon 2003*).

Anisomeridium biforme (Borrer) R. C. Harris.—(*Gagnon 2089*).

***Anisomeridium* sp**.—(*Pearson s.n., Randall 1071, Seavey and Seavey 15509*). This material apparently represents an undescribed *Anisomeridium.* In Harris (1995) it conforms to *Anisomeridium* sp. 29392A. The taxa appears to be common in South Florida as it has been found at Fakahatchee Strand Preserve State Park and several collections have been reported from Everglades National Park. However, all examples viewed by us have included only 2–5 perithecia, often with some in post mature condition. Whether this is an innate character of the species or there is a suitable voucher specimen out there somewhere is debatable. Regardless, it will not key to any described species in Harris (1995) nor are we able to find an available name among described *Anisomeridium* since that time.

Anisomeridium subprostans (Nyl.) R. C. Harris.—(*Kaminsky DJ018, Seavey and Seavey 15021*).

Anisomeridium tamarindi (Fée) R. C. Harris.—(*Randall 1043, Kaminsky DJ120, Seavey and Seavey 15383, 15448*).

Anisomeridium terminatum (Nyl.) R. C. Harris.—(*Seavey and Seavey 15286*). In the United States, this species is believed to be restricted to South Florida.

Arthonia abnormis (Ach.) Nyl.—(*Podaril KL051*). *Arthonia* Ach. is an extremely difficult genus, and very ubiquitous in South Florida. Molecular and other studies are beginning to illuminate familial and generic relationships contained within Arthoniales (Tehler, 1990; Grube, 1998; Sundin, and Tehler, 1998; Sundin, 1999; Ertz et al., 2009; Ertz, and Tehler, 2011; Frisch et al., 2014) and hopefully will one day unravel the current polyphyletic nature of *Arthonia.* However, until that time, one must rely on conventional identification methods of examining type protologues, descriptions, and identifications considered reliable, as well as, type specimens. The following species have been identified as part of a future publication that will attempt to classify the roughly 120 named *Arthonia* from the state of Florida. Type specimens and other reliably identified collections have been examined for a majority of the species below but there are still several *Arthonia* collections from this foray which remain unidentified and are not included here.

Arthonia antillarum (Fée) Nyl.—(*Guccion 2361, Podaril KL073*). This is one of the easier *Arthonia* to identify by its yellowish to orangish ascomata and the presence of lichexanthone (UV+ yellow).

Arthonia atra (Pers.) A. Schneid. Syn.: *Opegrapha atra*.—(*Guccion 2374*). *Opegrapha atra* was transferred to *Arthonia* as the result of molecular analysis (Ertz et al., 2009).

Arthonia cinnabarina (DC.) Wallr.—(*Guccion 2362, Podaril KL012, KL32, Seavey and Seavey 15293*).

Arthonia compensata Nyl.—(*Randall 1060*).

Arthonia compensatula Nyl.—(*Podaril KL078, Randall 1111, 1112, 1128*).

Arthonia complanata Fée.—(*Pearson 398, Seavey and Seavey 15510*).

Arthonia conferta (Fée) Nyl.—(*Podaril KL072, Randall 1042, 1113, Seavey and Seavey 15314, 15476*).

Arthonia distendens Nyl.—(*Guccion 2363*).

Arthonia erubescens Willey.—(*Seavey and Seavey 15385, 15445*). This collection matches well with the isotype at US as well as the unpublished notes lent us by Dr. Richard Harris (pers. comm., 2006). The species is known from Texas and Louisiana but apparently collected only one other time from Florida.

Arthonia hypochniza Nyl.—Figure 15B. (*Seavey and Seavey 15440*).

Arthonia macrotheca Fée.—(*Gagnon 2013, 207, Kaminsky DJ39, DJ44, Pearson 45, Podaril KL084, Seavey and Seavey 15230, 15155, 15156, 15435*).

Arthonia microsperma Nyl.—Figure 15A. (*Seavey and Seavey 15096*). The species identification is based on a review of the Cuban collections at FH. They are only marginally lichenized as is the Dagny Johnson material.

Arthonia ochrodiscodes Nyl.—(*Seavey and Seavey 15331, 15414, 15443*).

Arthonia ochrospila Nyl.—(*Gagnon 2036, 2057*).

Arthonia platygraphidea Nyl.—(*Guccion 2343, Seavey and Seavey 15096, 15268*).

Arthonia pruinosella Nyl.—(*Seavey and Seavey 15407*). *Arthonia pruinosella* is a non-lichenized member of the genus (Grube, 2007). However, a collection at FH appears to be lichenicolous on *Caloplaca*. In addition to this lone collection at Dagny, a specimen was also found during a Tuckerman workshop at FSP at the extreme southwest corner of Florida (Lücking et al., 2011).

Arthonia pruinosula Nyl.—(*Kaminsky DJ24, Seavey and Seavey 15169*).

****Arthonia pseudostromatica*** F. Seavey and J. Seavey.—Figure 8E–H. (*Seavey and Seavey 15010, 15105*). See above for a description of this new species.

Arthonia punctiformis Ach.—(*Seavey and Seavey 15308*).

Arthonia pyrrhuliza Nyl.—(*Kaminsky DJ40, DJ45, Seavey and Seavey 15426, 15442, 15446*).

Arthonia quintaria Nyl.—(*Seavey and Seavey 15422*).

Arthonia ravenelii Tuck.—(*Kaminsky DJ11*).

Arthonia redingeri Grube.—(*Seavey and Seavey 15353, 15425*). This taxon was described from material collected during an inventory of the Sonoran Desert (Grube, 2007). Up until that time it had been consistently lumped with *A. cinnabarina* (DC.) Wallr. Both have red anthraquinone crystals associated with the apothecia margin (reacting K+ purple) and usually varying amounts of white pruina on the disc. *Arthonia redingeri* has angular ascomata and smaller, generally 4-celled ascospores, while in *A. cinnabarina* the same features are round and 5-celled.

Arthonia rubella (Fee) Nyl.—(*Guccion 2344*).

Arthonia rubrocincta G. Merr. ex Grube and Lendemer.—(*Gagnon 2109, 2110*, *Seavey and Seavey 15074*).

***Arthonia* sp**.—(*Seavey and Seavey 15491*). This collection represents a species not on the North American lichen checklist nor have we been able to find an available name either in the Caribbean or other tropical regions. The muriform medium sized ascospores are arranged 2 per ascus while the black punctiform ascomata are loosely aggregated on a shiny, thinly corticate thallus. It will be subject to further investigation in a forthcoming paper on the genus in Florida.

Arthonia speciosa (Müll. Arg.) Grube.—(*Podaril KL079, Seavey and Seavey 15377, 15389, 15395*).

Arthonia subdiffusa Willey.—(*Randall 1096*).

Arthonia subrubella Nyl.—(*Kaminsky DJ20, Podaril KL053, Randall 1063, Seavey and Seavey 15252, 15406*).

+*Arthonia tavaresii Grube and Hafellner.—Figure 15E. (*Seavey and Seavey 15035*). Lichenicolous on *Pyrenula adacta* (see that species for more discussion).

Arthonia tuckermaniana Willey.—(*Gagnon 2008, Podaril KL052, KL063*). We have examined the isotype collection at US of this species. It has been annotated to *A. cinnabarina.* (DC.) Wallr. by Richard Harris and clearly represents that species. The type collection at H appears to be the same when viewed at Jstor Global Plants (2016)**.** *Arthonia tuckermaniana* was described by Henry Willey (1890) based on a Tuckerman collecton. We have viewed a collection at FH of this species from The Tuckerman collection and it matches our concept of the species used here. Several other examples have been found at nearby Everglades National Park. A photo of the species can be viewed at http://www.seaveyfieldguides.com/Lichens/photo_pgs_a/arthonia_tuckermaniana.html

Arthopyrenia cinchonae (Ach.) Müll. Arg.—(*Gagnon 2075, 2104*, *Podaril KL156*, *Randall 10159*, *Seavey and Seavey 15113*).

Arthopyrenia confluens R. C. Harris.—(*Kaminsky DJ038*).

Arthopyrenia lyrata R. C. Harris.—(*Gagnon 2091*).

Arthopyrenia majuscula (Nyl.) Zahlbr.—(*Gagnon 2068, Randall 1044, Seavey and Seavey 15098*).

Arthopyrenia minor R. C. Harris.—(*Seavey and Seavey 15305, 15306, 15307*).

Arthopyrenia oblongens R. C. Harris.—(*Kaminsky DJ064, Randall 1033, Seavey and Seavey 15170*).

Arthopyrenia planorbis (Ach.) Müll. Arg.—(*Randall 1058, Seavey and Seavey 15017*).

***Arthopyrenia* sp**.—(*Randall 1032*). The extremely broad clypeus and confluent perithecia of this collection are quite similar to *Arthopyrenia planorbis* (Ach.) Müll. Arg. yet the ascospores are distinctly undersize for that taxon and, unfortunately, pycnidia were not available. There are more than 500 named species of *Arthopyrenia* (Mycobank, 2016) with about 100 currently accepted (Kirk et al., 2001). Whether this is an anomalous collection of *A. planorbis* or another *Arthopyrenia,* described or not, awaits additional collections with pycnidia.

Arthopyrenia taxodii R. C. Harris.—(*Seavey and Seavey 15080*).

"*Aspidothelium*" sp.—(*Podaril KL002*). We use the generic name simply as a placeholder and include it in our inventory as it is certainly a distinct species from all others found in this foray, although it is definitely not this genus. The *Aspidothelium*-like perithecia associated with a thallus dissolved into cylindrical isidia is unknown in lichenology. As the thallus is absent it is difficult to know if the isidia and perithecia are two separate entities occupying the same space or if they are associated. Ascospores are hyaline, 2-celled and fusiform while paraphyses are branched and lightly anastomosing above the asci similar to *Anisomeridium*. Regardless, if the two are associated or not, a lichenized thallus dissolved into isidia with no secondary chemicals is a separate taxon from all others in this inventory.

Astrothelium nitidiusculum (Nyl.) Aptroot and Lücking Syn.: *Trypethelium nitidiusculum* (Nyl.) R. C. Harris.—(*Gagnon 2090*). Previously *Trypethelium nitidiusculum* (Nyl.) R. C. Harris but recently transferred to *Astrothelium* (Aptroot and Lücking, 2016).

Astrothelium phlyctaena (Fée) Aptroot and Lücking Syn.: *Trypethelium ochroleucum* (Eschw.) Nyl.—(*Gagnon 2032, Kaminsky DJ085, Podaril KL058, Seavey and Seavey 15249*). This binomial replaces the south Florida common taxa *Trypethelium ochroleucum* (Eschw.) Nyl. based on chronological priority and molecular analysis. (Aptroot and Lücking, 2016).

Astrothelium variolosum (Ach.) Müll. Arg.—(*Guccion 2345, Seavey and Seavey 15280*).

Athallia holocarpa Arup, Frödén, and Søchting Syn.: *Caloplaca holocarpa* (Hoffm. ex Ach.) M. Wade.—(*Seavey and Seavey 15428*). The molecular work of Arup et al. (2013) resulted in a massive realignment of Teloschistaceae with many *Caloplaca* being reassigned to different genera.

Bacidia aggregatula Malme.—(*Gagnon 2080, 2120*, *Podaril KL113*, *Randall 1016, 1024*, *Seavey and Seavey 15113*).

Bacidia campalea (Tuck.) S. Ekman and Kalb.—(*Gagnon 2020, Randall 1014, 1115*).

Bacidia hostheleoides (Nyl.) Zahlbr.—(*Podaril KL087, Seavey and Seavey 15318*).

Bacidia medialis (Tuck. ex Nyl.) B. de Lesd.—(*Podaril KL106*, *Randall 1028, 1038*, *Seavey and Seavey 15032*).

Bacidia mutabilis Malme.—(*Randall 1028, Seavey and Seavey 15374*).

Bacidia russeola (Kremp.) Zahlbr.—(*Seavey and Seavey 15066*).

Bacidia schweinitzii (Fr. ex E. Michener) A. Schneider.—(*Seavey and Seavey 15076, 15165, 15412*).

***Bacidia* sp**.—Figure 15G. (*Randall 1041, 1098, 113*, *Seavey and Seavey 15404, 15488, 15498, 15499*). We have assigned these collections to *Bacidia* based upon an I+ blue hymenium and *Byssoloma* type asci very similar to those of *Bacidina crystallifera* S. Ekman (Ekman, 1996). However, the thallus is of adnate squamules often eroding into a sorediate mass. Ascospores are consistently 4-celled, 18–25 × 3.5–4 μm and resemble those of *Fellhanera* rather than *Bacidia*, *Bacidina* or *Bacidiopsora*. Its generic placement needs to be reviewed more closely as it does not fit comfortably within any in our sphere of knowledge.

Bacidina brittoniana (Riddle) LaGreca and S. Ekman Syn.: *Bacidia varia* S. Ekman.—(*Seavey and Seavey 15511*).

Bacidina crystallifera S. Ekman.—Figure 16A. (*Gagnon 2085*). Although the apothecia margins in this collection are darker than described by Ekman (1996), the interior characteristics match correctly. Wide variations in apothecial disc and margin colorization are well known among many species within *Bacidia* and *Bacidina* and we consider that to be the case here.

Bacidina squamellosa S. Ekman.—(*Randall 1022*).

****Bacidiopsora orizabana*** (Vain.) Kalb.—Figure 15H. (*Podaril KL057*). The genus *Bacidiopsora* Kalb was recently reported for the first time from North America in 2014 with the finding of *B. squamulosula* at nearby Everglades National Park. This is the second species within the genus now known from North America. It is separated from other *Bacidiopsora* by the presence of long cylindrical isidia (Kalb, 1988; Aptroot et al., 2007). A review of Everglades National Park collections revealed its presence there also (FNPS Seavey 6911).

Bacidiopsora squamulosula (Nyl.) Kalb.—Figure 16B. (*Seavey and Seavey 15034, 15236*).

Bactrospora denticulata (Vain.) Egea and Torrente.—(*Gagnon 2108, Guccion 2364, Podaril KL062, Randall 1052*).

Bactrospora myriadea (Fée) Egea and Torrente.—(*Gagnon 2137, Podaril KL133, Seavey and Seavey 15060, 15077, 15087*).

***Baculifera micromera** (Vain.) Marbach.—Figure 16C. (*Seavey and Seavey 15433*). This taxon is distinguished in part by its K+ green epihymenium and sculptured ascospores. It can be keyed in Marbach (2000).

Bagliettoa baldensis (A. Massal.) Vezda.—(*Seavey and Seavey 154333, 15503*).

Bathelium carolinianum (Tuck.) R. C. Harris.—(*Gagnon 2051, Podaril KL043, Randall 1114, Seavey and Seavey 15234*).

Buellia bahiana Malme Syn.: *Hafellia bahiana* (Malme) Sheard.—(*Gagnon 2127, Guccion 2368, Pearson 411, Podaril KL027, Seavey and Seavey 15233*).

Buellia curatellae Malme Syn.: *Hafellia curatellae* (MaIme) Marbach.—(*Gagnon 2084, Seavey and Seavey 15330*).

Buellia erubescens Arnold Syn.: *Buellia stillingiana* J. Steiner.—(*Gagnon 2071, Kaminsky DJ065, Pearson 435, Podaril KL117, Seavey and Seavey 15297*).

Byssoloma leucoblepharum (Nyl.) Vainio.—(*Randall 1140*).

Caloplaca epiphora (Taylor) Dodge.—(*Podaril KL089, KL192*).

Caloplaca feracissima H. Magn.—(*Pearson 402a, Seavey and Seavey 15064, 15428*).

+**Caloplaca lecanorae** F. Seavey and J. Seavey.—(*Podaril KL008, Seavey and Seavey 15458*). Previously thought to be lichenicolous only on *Lecanora leprosa* Fée, this taxon was found also on the thallus of both *Buellia bahiana* Malme and *B. curatelle* Malme during this study.

Celothelium aciculiferum (Nyl.) Vainio.—(*Randall 1039, Seavey and Seavey 15459*).

Chaenotheca brunneola (Ach.) Müll. Arg.—(*Seavey and Seavey 15469, 15078*).

Chapsa alborosella (Nyl.) A. Frisch.—(*Gagnon 2040, Kaminsky DJ048, Randall 1084, Seavey and Seavey 15171, 15376*).

***Chapsa boninensis** (Tat. Matsumoto) Rivas Plata and Mangold.—Figure 16D. (*Gagnon 2058, 2167, Seavey and Seavey 15100, 15201*). Although we tentatively accept the existence of this species and the above as separate entities pending further study, the delimitating factor between the two is essentially ascospore size and septation. The differentiations expressed in Rivas Plata et al. (2010) are unsatisfactory in the South Florida collections as there is a great amount of overlap in these features.

Chapsa chionostoma (Nyl.) Rivas Plata and Mangold.—(*Seavey and Seavey 15100*).

Chapsa elongata ad int.—Figure 16E. (*Podaril KL001, Randall 1023, 1030*). This species is similar in appearance and chemistry to *C. alborosella* and *C. boninensis* but has larger ascospores (30-50 µm) and up to 19 septa. It will not key in the key provided by Rivas Plata et al. (2010).

***Chapsa paralbida** (Riddle) Rivas Plata and Lücking.—Figure 16F–G. (*Gagnon 2012, 2169, Kaminsky DJ004, Podaril KL070, KL134, Seavey and Seavey 15227*).

***Chapsa phlyctidioides** (Müll. Arg.) Mangold.—Figure 16H. (*Kaminsky DJ002*). *Chapsa phlyctidioides* is probably pantropical having been collected from Australia, Sri Lanka, South and Central America and the Caribbean (Hale, 1981; Mangold, 2008). In our collection the ascomata may be solitary or fused and elongate. The ascospores and chemistry are as described by Mangold (2008).

Chrysothrix xanthina (Vainio) Kalb.—(*Kaminsky DJ023*).

Clathroporina isidiifera R. C. Harris.—(*Gagnon 2001, Kaminsky DJ050, Pearson 415, Podaril KL026, Randall 1122, Seavey and Seavey 15190*). This is probably the most common lichen species encountered in forested sites within South Florida. It occurs in every forest hammock sampled in Everglades National Park and was also ubiquitous in the same habitat in this inventory.

Clathroporina subpungens (Malme) R. C. Harris.—(*Gagnon 2033, 2126, 2162*).

Coccocarpia erythroxyli (Sprengel) Swinscow and Krog.—(*Kaminsky DJ055, Podaril KL138*).

Coccocarpia palmicola (Sprengel) Arv. and D. J. Galloway.—(*Gagnon 2104, 2077, 2138, Kaminsky DJ053, DJ089*).

Coccocarpia pellita (Ach.) Müll. Arg.—(*Seavey* *and Seavey 15523*).

Coenogonium isidiatum (G. Thor and Vezda) Lücking, Aptroot and Sipman.—(*Seavey and Seavey 15322*).

Coenogonium isidiiferum (Lücking) Lücking.—(*Kaminsky DJ056*).

Coenogonium isidiigerum (Vezda and Osorio) Lücking, Aptroot and Sipman.—(*Seavey and Seavey 15408*).

Coenogonium isidiosum (Breuss) Rivas Plata, Lücking, Umaña and Chavez.—(*Randall 1151*).

*****Coenogonium maritimum*** F. Seavey and J. Seavey.—Figure 9A–D. (*Seavey and Seavey 15012*). See above for a description of this new species.

****Coenogonium pyrophthalmum*** (Mont.) Lücking, Aptroot and Sipman.—Figure 17A. (*Seavey and Seavey 15394*). The collection keys to this species in the *Coenogonium* publication by Rivas Plata et al. (2006) and in an updated key constructed by the first and second authors (Seavey and Seavey, unpub. data). It is also known from Peru, Colombia, Brazil, Venezuela, Ecuador, and Cuba (GBIFb, 2016).

Conioarthonia wilmsiana (Müll. Arg.) Grube.—(*Guccion 2366, Seavey and Seavey 15325*).

Crocynia pyxinoides Nyl.—(*Podaril KL183*).

*****Cryptothecia calusarum*** F. Seavey and J. Seavey.—Figure 9E–F. (*Seavey and Seavey 15309*). See above for description of this new species.

*****Cryptothecia randallii*** F. Seavey and J. Seavey.—Figure 9G–H. (*Podaril KL056*, *Randall 1002, 1005, 1076, Seavey and Seavey 15030, 15405*). See above for description of this new species.

Cryptothecia sp.—(*Seavey and Seavey 15515*). This corticolous taxon appears to be an undescribed *Cryptothecia* with a byssoid, ecorticate, hydrophobic thallus. Neither thalline ascigerous zones nor free asci were found but black immersed pycnidia are common with brown anastomosing hyphal walls. Conidia are bacillar 6–8 × 1. Thin layer chromatography showed the presence of stictic acid that, as far as we know, is currently absent from the genus. However, three species are known to contain norstictic acid and as stictic acid is along the same biosynthetic pathway, its presence does not seem overly anomalous. More material is needed for an accurate determination.

Cryptothecia striata G. Thor.—(*Podaril KL139, Seavey and Seavey 15009*).

*****Cryptothecia submacrocephala*** F. Seavey and J. Seavey.—Figure 10A–C. (*Seavey and Seavey 15486*). See above for description of this new species.

Dictyonema phyllogenum (Müll. Arg.) Zahlbr.—(*Kaminsky DJ084, Pearson 402c*).

Dictyonema sericeum (Sw.) Berk.—(*Kaminsky DJ077, Pearson 402, Randall 1077*).

Diorygma poitaei (Fée) Kalb, Staiger and Elix.—(*Gagnon 2156, Pearson 416, Podaril KL101, Seavey and Seavey 15168*).

Dirinaria applanata (Fée) D. D. Awasthi.—(*Kaminsky DJ060, Pearson 411a, Seavey and Seavey 15168*).

Dirinaria picta (Sw.) Clem. and Shear.—(*Guccion 2353, Kaminsky DJ102, Podaril KL137*).

Dirinaria purpurascens (Vainio) B. Moore.—(*Gagnon 2112, Guccion 2348, Kaminsky DJ067, Pearson 411b, Podaril KL167, Seavey and Seavey 15005*).

Dyplolabia afzelii (Ach.) A. Massal.—(*Gagnon 2045, Guccion 2349, Kaminsky DJ061, Pearson 407, Podaril KL124, Randall 1095, Seavey and Seavey 15143*).

Echinoplaca epiphylla Fèe.—(*Seavey and Seavey 15522*).

Enterographa anguinella (Nyl.) Redinger.—(*Kaminsky DJ075, Seavey and Seavey 15487, 15501*).

+*****Enterographa bagliettoae*** F. Seavey and J. Seavey.—Figure 10D–F. (*Seavey and Seavey 15501*). See above for description of this new lichenicolous species.

*****Enterographa johnsoniae*** F. Seavey and J. Seavey.—Figure 10G–H. (*Randall 1068*). See above for description of this new species.

*****Enterographa keylargoensis*** F. Seavey and J. Seavey.—Figure 11A–D. (*Randall 1070, 1074, Seavey and Seavey 15109*). See above for description of this new species.

Enterographa pallidella (Nyl.) Redinger.—(*Podaril KL118*).

Enterographa quassiicola Fée.—(*Kaminsky DJ074, Podaril KL179, Seavey and Seavey 15480*).

Enterographa subserialis (Nyl.) Redinger.—(*Randall 1078, Seavey and Seavey 15484*).

Fissurina aggregatula Common and Lücking.—(*Kaminsky DJ118, Podaril KL123*). Lendemer and Harris (2014) have provided a much needed North American key to this difficult genus.

****Fissurina albolabiata*** F. Seavey and J. Seavey.—Figure 11E–H. (*Kaminsky DJ041*, *Randall 1101, 1069*, *Seavey and Seavey 15364*). See above for a description of this new species. In the Lendemer and Harris North American key (2014) this taxon would key out at couplet 7 with *Fissurina cingalina* (Nyl.) Staiger and *F. aff. elaiocarpa* (A. W. Archer) A. W. Archer. The differences are discussed in the account of *F. albolabiata.*

Fissurina analphabetica Common and Lücking.—(*Seavey and Seavey 15427, 15477*).

Fissurina cingalina (Nyl.) Staiger.—(*Seavey and Seavey 15008, 15296*).

Fissurina egena (Nyl.) Nyl.—(*Kaminsky DJ104, Seavey and Seavey 15222*).

Fissurina illiterata (R. C. Harris) Lendemer.—(*Pearson 452, Seavey and Seavey 15386*).

****Fissurina incisura*** F. Seavey and J. Seavey.—Figure 12A–C. (*Seavey and Seavey 15027, 15304, 15336, 15380, 15444*). See above for a description of this new species. In the Lendemer and Harris North American key (2014) this taxon would key out at couplet 5 with *Fissurina subcomparimuralis* Common and Lücking. The differences are explained in the discussion section within the account of *F. incisura.*

Fissurina mexicana (Zahlbr.) Lücking and Rivas Plata.—(*Gagnon 2053*).

Fissurina scolecitis (Tuck.) Lendemer.—(*Seavey and Seavey 15189*).

Fissurina subcomparimuralis Common and Lücking.—(*Kaminsky DJ012, Seavey and Seavey 15223, 15285*).

Fissurina subnitidula (Nyl.) Staiger.—(*Seavey and Seavey 15432*).

Fissurina tachygrapha (Nyl.) Staiger.—(*Randall 1018, Seavey and Seavey, 15228, 15420*).

Flakea papillata O. E. Erikss.—(*Podaril KL167, Seavey and Seavey 15146*).

Gassicurtia coccinea Fée Syn.: *Buellia coccinea* (Fée) Aptroot.—(*Seavey and Seavey 15014*).

Glyphis cicatricosa Ach.—(*Gagnon 1130, 1175*, *Kaminsky DJ076*, *Pearson 425*, *Podaril KL151*, *Randall 1129*, *Seavey and Seavey 15288*).

Glyphis scyphulifera (Ach.) Staiger.—(*Gagnon 1135, 1141*, *Kaminsky DJ057*, *Seavey and Seavey 15311*).

***Graphis bungartzii** Barcenas-Peña, Lücking, Herrera-Campos and R. Miranda.—Figure 17B. (*Podaril KL099*). This collection matches well with that described by Barcenas Peña (2014). To our knowledge there are only four other *Graphis* worldwide with the combination of striate labiae, clear hymenia, small transversely septate ascospores, laterally carbonized excipula, and norstictic acid. All four have much larger ascospores and other different traits. An updated key to the *Graphis* species known from Florida is provided below.

Graphis cincta (Pers.) Aptroot.—(*Pearson 400, Podaril KL161, Randall 1009, Seavey and Seavey 15158*).

Graphis dendrogramma Nyl.—(*Randall 1148*).

Graphis disserpens Nyl.—(*Seavey and Seavey 15039*).

***Graphis elongata** Zenker.—(*Kaminsky DJ028*).

****Graphis ferrugineodisca*** F. Seavey and J. Seavey.—Figure 12D–E. (*Seavey and Seavey 15298, 15300, 15301*). See above for description of this new species.

Graphis handellii Zahlbr.—(*Seavey and Seavey 15523*).

****Graphis koltermaniae*** F. Seavey and J. Seavey.—Figure 12D–E. (*Seavey and Seavey 15382, 15416*). See above for description of this new species.

Graphis leptocarpa Fée.—(*Seavey and Seavey 15492*).

Graphis librata C. Knight.—(*Seavey and Seavey 15161*).

Graphis lineola Ach.—(*Gagnon 2083, 2121*, *Kaminsky DJ062*, *Podaril KL150*, *Randall 1085*, *Seavey and Seavey 15402*).

Graphis neoelongata Lücking.—(*Podaril KL136, Seavey and Seavey 15475*).

Graphis oshioi M. Nakan**.—**(*Podaril KL019*). Collectors may find this taxon difficult to identify at the generic level because *Graphis oshioi* does not fit Staiger's (2002) concept of *Graphis* as it lacks a carbonized exciple. Based on Staiger's work, Nakanishi et al. (2003) placed this taxon into the genus *Hemithecium* due to the prominent non-carbonized raised labia. Subsequently, it was referred to *Graphis* by Rivas Plata et al. (2011).

Graphis perstriatula Nyl.—Figure 17C. (*Gagnon 2095, Seavey and Seavey 15294*). Collected for the first time from North America, *Graphis perstriatula* is similar to *Graphis parilis* (Kremp.) known from Louisiana (Harris, 1995), but contains norstictic acid in place of stictic acid. It is a pantropical species that has been found in Costa Rica and several West Indian locations (GBIFd, 2016).

Graphis pinicola Zahlbr.—(*Kaminsky DJ013*, *Podaril KL144, Randall 1050*).

Graphis proserpens Vain.—(*Seavey and Seavey 14410*).

Graphis pseudoserpens Chaves, Lücking and Umaña.—Figure 17D. (*Seavey and Seavey 15495*). *Graphis pseudoserpens* is a Neotropical species not previously known from North America. During this foray it was originally misidentified as *Graphis puiggarii* (Mull. Arg.) Lücking but differs by its larger ascospores and a lateral thalline margin (*tenella*-morph).

Graphis renschiana (Mull. Arg.) Stizenb.—(*Seavey and Seavey 15421*).

Graphis rimulosa (Mont.) Trevisan.—(*Seavey and Seavey 15160, 15346*).

Graphis tenella Ach.—(*Seavey and Seavey 15093, 15493*).

Haematomma persoonii (Fée) Massal.—(*Gagnon 2026, 2100, 2124*, *Guccion 2367*, *Pearson 430*).

Heiomasia seaveyorum Nelsen and Lücking.—(*Gagnon 2001, Guccion 2350*).

Julella geminella (Nyl.) R. C. Harris.—(*Gagnon 2059, 2061, 2072*).

Julella sericea (A. Massal.) Coppins.—(*Gagnon 2060*).

Julella variiformis R. C. Harris.—(*Kaminsky DJ026*).

+Labrocarpon canariensis (D. Hawksw.) Etayo and Pérez-Ortega.—(*Seavey and Seavey 15007*). This taxon is common throughout South Florida always on *Ochrolechia africana.*

Lecanora achroa Nyl.—(*Randall 2163*, *Seavey and Seavey 13473*).

Lecanora caesiorubella ssp. glaucomodes (Nyl.) Imshaug and Brodo.—(*Guccion 2369*).

Lecanora floridula Lumbsch.—(*Gagnon 2106*, *Podaril KL091, KL146*, *Seavey and Seavey 15166*).

Lecanora helva Stizenb.—(*Gagnon 2018, Seavey and Seavey 15483*).

Lecanora hypocrocina Nyl.—(Seavey and Seavey 15481).

Lecanora leprosa Fée.—(*Pearson 436a*, *Podaril KL029*, *Randall 1134, 1153*, *Seavey and Seavey 15015, 15274*).

Lecanora pseudargentata Lumbsch.—(*Podaril KL157*).

Lecanora strobilina (Sprengel) Kieffer.—(*Guccion 2370, Pearson 429, Podaril KL033*).

Lecanora substrobilina Printzen.—Figure 17E. (Gagnon 2105, *Podaril KL033, Pearson 432, Seavey and Seavey 15464, 15481, 15521*). This taxon conforms in all respects to *L. substrobilina* except the xanthones described for the species by Printzen are concentrated in the apothecia in Dagny collections. The thallus contains only usnic acid. We do not consider this of taxonomic importance.

Lecidea varians Ach. Syn.: *Pyrrhospora varians* (Ach.) R. C. Harris.—(*Guccion 2391, Pearson 453, Seavey and Seavey 15392*).

Leiorreuma erodens F. Seavey and J. Seavey.—Figure 13A–B. (*Seavey and Seavey 15107*). See above for description of this new species.

Leiorreuma sericeum (Eschw.) Staiger.—(*Podaril KL097, Seavey and Seavey 15238*).

Leptogium austroamericanum (Malme) C. W. Dodge.—(*Gagnon 2056, Kaminsky DJ070, Seavey and Seavey 15150*). Molecular work on some South Florida collections of *Leptogium austroamericanum* has shown the presence of another species close to *L. arsenei* Sierk. Currently, no collections of the latter species have been recorded from South Florida.

Leptogium chloromelum (Sw.) Nyl.—(*Gagnon 2025*).

Leptogium cyanescens (Rabenh.) Körber.—(*Kaminsky DJ069, DJ088*, *Pearson 421*, *Podaril KL094, KL108*, *Seavey and Seavey 15154*).

Leptogium denticulatum Nyl.—(*Seavey and Seavey 15219*). Sierk (1964) separates this taxa from *L. cyanescens* in his keys by the exclusive presence of marginal squamuliform isidia. Although *L. cyanescens* may also have this form of isidia it is always coupled with cylindrical isidia on laminal surfaces as well. Many examples of *Leptogium* with only squamuliform isidia can be found in South Florida as well as examples with both forms present on the same thallus. This seems to us an unstable basis on which to claim speciation as it pertains to South Florida material. Preliminary molecular work on the two species points to them being conspecific. However, *L. denticulatum* remains on South Florida checklists until published data refutes its presence in the region. We have not seen the western material ascribed to *L. denticulatum* and it may well be that the South Florida interpretation of the species is faulty.

Leptotrema wightii (Taylor) Müll. Arg.—(*Gagnon 2013, Pearson 423, Seavey and Seavey 15152*).

Letrouitia domingensis (Pers.) Hafellner and Bellem.—(*Podaril KL107*).

Leucodecton compunctellum (Nyl.) A. Frisch.—(*Randall 1008, Seavey and Seavey 15162*).

****Leucodecton compunctum*** (Ach.) A. Massal.—Figure 17F. (*Gagnon 2034, Kaminsky DJ046, Randall 11027, Seavey and Seavey 15283, 15393*). *Leucodecton compunctum*, *L. fissurinum* and *L. subcompunctum* (Nyl.) A. Frisch form a group of similar taxa, all with the stictic acid aggregate and brown muriform ascospores of more or less similar length. *Leucodecton subcompunctum* (not found in this inventory) can be separated from the others by its lepadinoid exciple (i.e. excipula separating from its surrounding tissue). Both *L. compunctum* and *L. fissurinum* have crystallate thalli but in the case of the former they are larger and visible in surface view making the thallus appear coarse and verruculose while the thallus of the later is smooth, homogeneous and often fissured. Finally, *L. compunctum* has considerably wider (up to 18 µm) ascospores in comparison to those of *L. fissurinum* (10–13 µm).

****Leucodecton fissurinum*** (Hale) A. Frisch.—Figure 17 G. (*Seavey and Seavey 15348*).

Leucodecton glaucescens (Nyl.) A. Frisch.—(*Podaril KL023, Randall 1123, Seavey and Seavey 15153*).

Leucodecton occultum (Eschw.) A. Frisch.—(*Kaminsky DJ087, Podaril KL088, Randall 1127*).

****Malmidea cineracea*** Bruess and Lücking.—Figure 17H. (*Gagnon 2092*). Although the apothecia margins are somewhat lighter in color than that described by the authors, other characters (granular-isidiate thallus, yellowish medulla and crystal encrusted excipula) are present. It was found only once at site 1 of this inventory. This taxon was recently described from Nicaragua (Breuss and Lücking, 2015).

Malmidea furfurosa (Tuck.ex Nyl.) Kalb and Lücking.—(*Seavey and Seavey 15095,15465*).

+Marchandiomyces buckii Diederich and Lawrey.—Figure 18A–B. (*Gagnon 2183*). Lichenicolous on *Bacidia heterochroa* (Müll. Arg.) Zahlbr.

Mazosia carnea (Eckfeldt) Aptroot and M. Cáceres.—Figure 18C–D. (*Gagnon 2154, Kaminsky DJ01, Podaril KL016*). A review of *Mazosia* A. Massal. collected during this inventory revealed the presence of two species sensu Aptroot et al. (2014). The differences between *Mazosia carnea* and *M. viridescens* are mostly confined to thallus and ascomata superficial characteristics, the former having a smooth thallus, the latter verrucose. The ascomatal margin is more sharply defined in *M. viridescens* and although ascospore size is nearly identical they have slightly different shapes and locular attributes.

Mazosia viridescens (Fèe) Aptroot and M. Cáceres.—Figure 18E–F. (*Seavey and Seavey 15526*).

Megalaria pannosa (Zahlbr.) Fryday and Lendemer.—(*Randall 1035*).

+***Melanographa tribuloides*** (Tuck.) Müll. Arg. Syn.: *Melaspilea tribuloides* (Tuck.) Müll. Arg.—(*Seavey and Seavey 15220*).

Melaspilea amota Nyl.—(*Kaminsky DJ010, Podaril KL060, Seavey and Seavey 15011, 15316, 15474*). All *Melaspilea* were identified using the North American key to the genus provided in Perlmutter et al. (2015).

+***Melaspilea cupularis*** Mull. Arg.—(*Gagnon 2172, Guccion 2351*).

Melaspilea demissa (Tuck.) Zahlbr.—(*Gagnon 2052*).

+***Melaspilea epigena*** Müll. Arg.—(*Seavey and Seavey 15164*). Lichenicolous on *Leucodecton compunctum*.

Melaspilea maculosa (Fr.) Müll. Arg.—(*Pearson 413, Randall 1051, Seavey and Seavey 15226*).

Melaspilea urceolata (Fr.) Ertz and Diederich Syn.: *Melaspilea arthonioides* (Fée) Nyl.—(*Seavey and Seavey 15316*).

Metamelanea melambola (Tuck.) Henssen.—(*Podaril KL011*).

****Monoblastia palmicola*** Riddle.—Figure 18G–H. (*Gagnon 2054, Randall 1097*). This distinct species was reported by Seavey and Seavey (2012) from Everglades National Park but somehow was not included in the North American checklist.

****Mycomicrothelia apposita*** (Nyl.) D. Hawksw.—Figure 19A–B. (*Kaminsky DJ037*).

Mycomicrothelia decipiens (Müll. Arg.) R. C. Harris.—(*Randall 1081*).

Mycoporum acervatum R. C. Harris.—(*Gagnon 2058*).

Mycoporum californicum (Zahlbr.) R. C. Harris.—(*Seavey and Seavey 15441*).

Mycoporum eschweileri (Müll. Arg.) R. C. Harris.—(*Seavey and Seavey 15413, 15429*).

Myriotrema erodens R. C. Harris.—(*Pearson 418*).

Myriotrema glauculum (Nyl.) Hale.—(*Podaril KL086, KL126*).

Myriotrema peninsulae R. C. Harris.—(*Pearson 419*).

Myriotrema terebratulum (Nyl.) Hale.—(*Podaril KL086*).

Nigrovothelium tropicum (Ach.) Lücking, M. P. Nelson and Aptroot Syn.: *Trypethelium tropicum* (Ach.) Müll. Arg.—(*Gagnon 2044, 2050*, *Guccion 2342*, *Kaminsky DJ083*, *Podaril KL170*, *Randall 1130*). The very common tropical species *Trypethelium tropicum* (Ach.) Müll. Arg. is now placed in the genus *Nigrovothelium* due to a massive revision of Trypetheliaceae (Aptroot and Lücking, 2016).

Ocellularia obturascens (Nyl.) Hale.—(*Podaril KL006, Randall 1132, Seavey and Seavey 15131*). In Harris (1995), this is treated as *Myriotrema bahianum* (Ach.) Hale.

Ochrolechia africana Vainio.—(*Gagnon 2021, Kaminsky DJ066, Pearson 424, Podaril KL146, Seavey and Seavey 15251*).

Opegrapha candida Müll. Arg.—(*Pearson 456, Randall 1102, Seavey and Seavey 15387*).

Opegrapha keyensis F. Seavey and J. Seavey.—(*Podaril KL122, Randall 1040*). This recently described *Opegrapha* (Seavey et al., 2014) is widely distributed throughout the keys (islands) in Florida Bay and in the upper Florida Keys. However, it has not yet been found on the Florida mainland. Currently, this is considered to be an endemic taxon with a subtropical coastal habitat.

Opegrapha rupestris Pers.—(*Seavey and Seavey 15502*).

Opegrapha sp.—Figure 19C–D. (*Randall 1061*). This taxa is included in Harris (1995) as *Opegrapha* sp. Britton 799. Although it is distinct from all other Florida species of *Opegrapha*, there are several potential names which seem to be close to this collection but the type specimens have yet to be reviewed.

Opegrapha vulgata Ach.—(*Randall 1059, 1004,* *1082*).

Parmotrema gardneri (C. W. Dodge) Sérus.—(*Kaminsky DJ 098, Pearson 409, Podaril KL041*).

Parmotrema praesorediosum (Nyl.) Hale.—(*Podaril KL164*).

Parmotrema tinctorum (Zahlbr.) Hale.—(*Seavey and Seavey 15494*).

****Pertusaria rigida*** Müll. Arg.—Figure 19E. (*Randall 1154*). This singular *Pertusaria* was found once and is represented by a small section of bark with only a few poriform apothecia. HPLC revealed the presence of 4, 5-dichlorolichexanthone and the absence of depsides and depsidones. In the Archer and Elix (2011) world-wide key, *Pertusaria rigida* Müll. Arg. is an available name. Other characteristics such as ascospore size, orientation within the ascus and ostiole characteristics are also consistent with that species. It is native to Australia but we have found no examples in the Neotropics. This very large range extension is disquieting but not unknown.

****Pertusaria subrigida*** Müll. Arg.—Figure 19F. (*Randall 1156*). *Pertusaria subrigida* is a somewhat anomalous member of the genus by being devoid of secondary metabolites. A description of the species from Australia fits the Dagny collection comfortably and it also keys to this species in the Archer and Elix (2011) world-wide key. Collections are known from Central and South America as well as Australasia and Africa (Archer and Elix, 2011; GBIFd, 2015; Lias, 2015).

Pertusaria texana Müll. Arg.—(*Podaril KL173, Randall 1175*).

Pertusaria xanthodes Müll. Arg.—(*Gagnon 2023, 2065*, *Kaminsky DJ105*, *Pearson 431*, *Podaril KL064*, *Seavey and Seavey 15355*).

Phaeographis brasiliensis (A.Massal.) Kalb and Matthes-Leicht.—(*Kaminsky DJ120*).

Phaeographis dendritica Müll. Arg.—(*Seavey and Seavey 15334*).

****Phaeographis dividens*** (Nyl.) Kr. P. Singh and Swarnalatha.—Figure 19G–H. (*Seavey and Seavey 15119*). The Dagny Johnson material with no substances, inspersed hymenia, small submuriform ascospores and uncarbonized excipula matches well with this species described from Columbia and also recorded for Brazil and Venezuela (GBIFa, 2015). It has been collected under the following synonyms: *Graphis dividens* Nyl., *Graphina dividens* (Nyl.) Müll. Arg., and *Phaeographina dividens* (Nyl.) Kr.P. Singh and D.D. Awasthi.

Phaeographis erumpens (Nyl.) Müll. Arg.—(*Seavey and Seavey 15069*).

Phaeographis flavescens Dal Forno and Eliasaro.—(*Podaril KL098*).

Phaeographis leiogrammodes (Kremp.) Müll. Arg.—(*Seavey and Seavey 15290*).

Phaeographis nylanderi (Vainio) Zahlbr.—(*Kaminsky DJ111, Podaril KL153, Randall 1083, Seavey and Seavey 15436, 15106*).

*****Phaeographis pseudostromatica*** F. Seavey and J. Seavey.—Figure 13C–D. (*Seavey and Seavey 15111, 15289*). See above for description of this new species.

Phaeographis punctiformis (Eschw.) Müll. Arg.—(*Podaril KL131, Seavey and Seavey 15049*).

****Phaeographis quadrifera*** (Nyl.) Staiger.—Figure 20A. (*Podaril KL130, Randall 1135, Seavey and Seavey 15167*). *Phaeographis quadrifera* is one of a group of *Phaeographis* represented by inspersed hymenia, muriform ascospores and the presence of norstictic acid. They are separated mostly by the extent or lack of excipular carbonization and ascospore size with *P. quadrifera* being the non-carbonized, small ascospore member of the group (Staiger, 2002). It has also been collected from Everglades National Park and is known from Cuba, Costa Rica and Jamaica (GBIFc).

*****Phaeographis radiata*** F. Seavey and J. Seavey.—Figure 13E–H. (*Randall 1037*). See above for description of this new species.

Phaeographis **sp**.—Figure 20B. (*Podaril KL152*). This *Phaeographis* is very similar to *P. quadrifera* (see above). It differs only by narrower ascospores and a thin laterally carbonized exciple. *Phaeographis schizolomoides* V. Poengsungnoen and K. Kalb, recently described from Thailand, matches well with the description and photo provided by the authors but also lacks excipular carbonization. Despite a diligent search of tropical *Phaeographis* and *Phaeographina* we have yet to find a name for this collection as it appears likely to be an undescribed species. However, the one collection from this foray is unsuitable for a holotype voucher specimen.

Phyllopsora corallina var. ***corallina*** (Eschw) Müll. Arg.—(*Seavey and Seavey 15134, 15135*).

Phyllopsora furfuracea (Pers.) Zahlbr.—(*Podaril KL 172, Seavey and Seavey 15317*).

Phyllopsora glabella (Nylander) G. Schneider.—(*Seavey and Seavey 15145*).

***Phyllopsora glaucescens** (Nyl.) Gotth. Schneider.—Figure 20D. (*Kaminsky DJ005*). The algal layer of this *Phyllopsora* is thinly overgrown by white stringy hyphae causing the thallus to become tomentose and acquire a bluish hue. In older specimens white filamentous hyphae may be seen emanating out from the medullary layer. The margins become laciniate as the lichen ages. Described by Timdal (2008), it was previously known from several collections obtained in Peru. In the field it may be confused with *Crocynia pyxinoides* Nyl., but it lacks the distinctive black hypothallus of that taxa.

Phyllopsora isidiotyla (Vainio) Riddle.—(*Podaril KL174*).

Phyllopsora lacerata Timdal.—(*Podaril KL105, Seavey and Seavey 15424*).

Physcia atrostriata Moberg.—(*Seavey and Seavey 15249*).

Physcia neogaea R. C. Harris.—(*Guccion 2356, Kaminsky DJ119, Pearson 437, Podaril KL165, Randall 1136*).

Physcia sorediosa (Vainio) Lynge.—(*Podaril KL119*).

Physcia undulata R. C Harris.—(*Seavey and Seavey 15438*).

Platygramme coccinea F. Seavey and J. Seavey.—(*Pearson 414, Seavey and Seavey 15130*). A world key to *Platygramme* is provided below.

****Platygramme elegantula** F. Seavey and J. Seavey.—Figure 14A–C. (*Seavey and Seavey 15110*). See above for description of this new species.

Platygramme pachnodes (Fée) E.Tripp and Lendemer.—(*Gagnon 2096, 2150*, *Kaminsky DJ110*, *Pearson 434*, *Podaril KL068*, *Randall 1053*, *Seavey and Seavey 15399*).

Platythecium grammites (Fée) Staiger.—(*Kaminsky DJ006, Pearson 417, Podaril KL092, Seavey and Seavey 15174*).

Polymeridium albidum (Müll. Arg.) R. C. Harris.—(*Seavey and Seavey 15390, 15461*).

Polymeridium catapastum (Nyl.) R. C. Harris.—(*Seavey and Seavey 15368, 15108*).

Polymeridium contendens (Nyl.) R. C. Harris.—(*Pearson P048*).

Porina nucula Ach.—(*Gagnon 2009, Podaril KL027, Seavey and Seavey 15242*).

Porina nuculastrum (Müll. Arg.) R. C. Harris.—(*Gagnon 2158, Randall 1086, Seavey and Seavey 15193*).

Porina scabrida R. C. Harris.—(*Kaminsky DJ022*).

Pseudopyrenula subnudata Müll. Arg.—(*Pearson 439, Seavey and Seavey 15025*).

Pseudosagedia cestrensis (Tuck. ex E. Michener) R. C. Harris.—(*Randall 1075*).

Pyrenula acutispora Kalb and Hafellner.—(*Podaril KL059, Randall 1106*).

Pyrenula adacta Fée.—(*Gagnon 2171, 2179*, *Guccion 2337*, *Kaminsky DJ091*, *Podaril KL069*, *Randall 1143*, *Seavey and Seavey 15246*). *Pyrenula adacta* was extremely common during the Dagny foray and found on the smooth bark of nearly every *Lysiloma latisiliquum* (L.) Benth. along forest margins in almost full sun. Several specimens were being parasitized by *Arthonia tavaresii* Grube and Hafellner. The effect of this dramatically changes the appearance of the host, in particular causing a thick thalline margin to cover and eventually engulf the perithecia. This species is included in Harris (1995) as *P. martinicana* (Vain.) R. C. Harris.

Pyrenula anomala (Ach.) Vainio.—(*Kaminsky DJ017, Randall 1103*).

Pyrenula astroidea (Fée) R. C. Harris.—(*Gagnon 2028, 2168*, *Randall 1105*, *Seavey and Seavey 15247*).

Pyrenula breutelii (Müll. Arg.) Aptroot.—(*Guccion 2357, Randall 1073, Seavey and*

Seavey 15000). This species is included in Harris (1995) as *P. macularis* (Zahlbr.) R. C. Harris.

Pyrenula cerina Eschw.—(*Gagnon 2115, Guccion 2372, Pearson 454a, Seavey and Seavey 15341*).

Pyrenula circumfiniens Vain.—(*Seavey and Seavey 15267*). This species is included in Harris (1995) as *P. subferruginea* (Malme) R. C. Harris.

Pyrenula cocoes Müll. Arg.—(*Gagnon 2041, Randall 1077*).

Pyrenula cruenta (Mont.) Vainio.—(*Gagnon 2049, 2181*, *Guccion 2339*, *Kaminsky DJ092*, *Pearson 408*, *Podaril KL66*, *Randall 1107*, *Seavey and Seavey 15184*).

Pyrenula cubana (Müll. Arg.) R. C. Harris.—(*Randall 1110, Seavey and Seavey 15271*).

Pyrenula cuyabensis (Malme) R. C. Harris.—(*Randall 1079*).

Pyrenula dissimulans (Müll. Arg.) R. C. Harris.—(*Gagnon 2170, Seavey and Seavey 15140*). For an interesting discussion of this species, see Harris (1995:104).

Pyrenula leucostoma Ach.—(*Guccion 2346, Randall 1080*).

Pyrenula microtheca R. C. Harris.—(*Kaminsky DJ096, Randall 1056, Seavey and Seavey 15182*).

Pyrenula nitidula (Bres.) R. C. Harris.—(*Kaminsky DJ019, Randall 1108*).

Pyrenula ochraceoflava (Nyl.) R. C. Harris.—(*Guccion 2373, Pearson 455, Podaril KL148, Randall 1104, Seavey and Seavey 15172*).

Pyrenula ochraceoflavens (Nyl.) R. C. Harris.—(*Gagnon 2092, 2143*, *Guccion 2347*, *Pearson 406*, *Randall1065*, *Seavey and Seavey 15085*).

Pyrenula oleosa R. C. Harris.—(*Kaminsky DJ093, Seavey and Seavey 15114*).

Pyrenula papillifera (Nyl.) Aptroot.—(*Pearson 422*). This species is included in Harris (1995) as *P. mucosa* (Vain.) R. C. Harris.

Pyrenula parvinuclea (Meyen and Flotow) Aptroot.—(*Seavey and Seavey 15277*).

Pyrenula punctella (Nyl.) Trevisan.—(*Guccion 2358, Pearson 401*).

Pyrenula quassiicola Fée.—(*Seavey and Seavey 15002*).

Pyrenula septicollaris (Eschw.) R. C. Harris.—(*Podaril KL128*).

Pyrenula sexlocularis (Nyl.) Müll. Arg.—(*Guccion 2338*). This species is included in Harris (1995) as *P. concatervans* (Nyl.) R.C. Harris.

Pyrenula thelomorpha Tuck.—(*Gagnon 2160, Guccion 2340, Kaminsky DJ094, Podaril KL120*).

Pyrenula wheeleri R. C. Harris.—(*Kaminsky DJ072*).

Pyrrhospora quernea (Dicks.) Körb.—(*Guccion 2365, Podaril KL016, Seavey and Seavey 15472*).

Pyxine cocoes (Swartz) Nyl.—(*Gagnon 2145*).

Ramalina complanata (Sw.) Ach.—(*Pearson 427, Seavey and Seavey 15388*).

Ramalina dendriscoides Nyl.—(*Pearson 428*).

Ramalina denticulata Nyl.—*(Gagnon 2113, Guccion 2376, Kaminsky DJ106, Pearson 428a. Podaril KL178*). Some authors disagree with the specific status of this and *R. complanata.* Varying opinions can be found in Howe (1914), Jones (1964), Concepción (1972), Kashiwadani and Kalb (1993) and Aptroot and Bungartz (2007). In this inventory we follow the North American lichen checklist which lists both species. We separate the two on the basis of chemistry and the more gracile stature of *R. denticulata*.

Ramalina montagnei De Not.—(*Seavey and Seavey 15449*).

******Ramalina ramificans*** F. Seavey and J. Seavey.—Figure 14D–F. (*Seavey and Seavey 15337*). See above for description of this new species.

Ramalina stenospora Müll. Arg.—(*Kaminsky DJ107, Podaril KL177, Seavey and Seavey 15396*).

Ramalina willeyi R. Howe.—(*Gagnon 2067, Seavey and Seavey 15361*).

Rinodina intrusa (Nyl.) Malme.—(*Kaminsky DJ007*).

Sarcographa labyrinthica (Ach.) Mull. Arg.—(*Guccion 2352*).

Sarcographa tricosa (Ach.) Müll. Arg.—(*Gagnon 2046, 2165*, *Kaminsky DJ112*, *Pearson 414*, *Podaril KL109*, *Randall 1131*, *Seavey and Seavey 15342*).

Sclerophyton elegans Eschw.—(*Seavey and Seavey 15200*).

Stictis urceolatum (Ach.) Gilemstam.—(*Gagnon 2002, 2064*, *Seavey and Seavey 15313, 15381*).

****Stigmatochroma gerontoides*** (Stirt.) Marbach Syn.: *Buellia gerontoides* (Stirton) Imshaug.—Figure 20E. (*Hollinger 5889, Podaril KL057, Seavey and Seavey 15299*).

****Stirtonia alba*** Makhija and Patw.—(*Podaril KL168*). Most species of the tropical genus *Stirtonia* are cryptic, often manifested by wispy, white, powdery areas on an indeterminate thallus. Prior to 2010 it was believed restricted to the Palaeotropics but a world-wide key published in 2009 and updated in 2014 (Aptroot, 2009; Aptroot et al., 2014) resulted in many species being reported from the Neotropics as well. Additional *Stirtonia* have subsequently been described from the Western Hemisphere (Seavey and Seavey, 2015; *Stirtonia divaricatica,* this paper). An updated Neotropical key is provided below. This is the first report of *S. alba* in the New World.

Stirtonia byssoidea F. Seavey and J.Seavey.—(*Podaril KL140, Seavey and Seavey 15310*). This species is rare on the Florida mainland but abundant on Key Largo. Aptroot (pers. comm., 2015) suggested *S. byssoidea* might better be placed in the genus *Crypthonia.* While some characters of the species agree with that placement, e.g. a byssoid, felty thallus surface, presence of a prothallus and maculiform ascigerous zones (Frisch and Thor, 2010), we opted to place it within *Stirtonia* based upon its ascus structure, i. e. nearly uniformly round, characteristic of *Stirtonia* (Aptroot, 2009) versus clavate or broadly clavate in *Crypthonia* (Frisch and Thor, 2010). In addition *S. byssoidea* exhibits no hamathecial structure, lacking hymenium, hypothecium, etc. both of which are reportedly present in *Crypthonia* (Frisch and Thor, 2010).

Stirtonia coei F. Seavey and J. Seavey.—(*Randall 1058, 1162*).

*****Stirtonia divaricatica*** F. Seavey and J. Seavey.—Figure 14G–H. (*Seavey and Seavey 15198*). See above for description of this new species.

Stirtonia latispora F. Seavey and J. Seavey.—(*Kaminsky DJ021, Podaril KL141, Randall 1133, Seavey and Seavey 15147*).

Strigula americana R. C. Harris.—(*Randall 1149*).

Strigula bermudana (Nyl.) R. C. Harris.—(*Podaril KL155, KL166*).

Strigula orbicularis Fr.—(*Kaminsky DJ047*). This and the next foliicolous species were extremely common at site 1 (most mature forest) but only on the leaves of *Gymnanthes lucida* Sw. and to a lesser extent *Coccolobia diversifolia* Jacq.

Strigula smaragdula Fr.—(*Kaminsky DJ099, Pearson 412, Randall 1139*).

Syncesia byssina (Vainio) Tehler.—(*Kaminsky DJ058, Podaril KL014, Seavey and Seavey 15115*).

Syncesia depressa (Fée) Tehler.—(*Guccion 2377, Kaminsky DJ059, Pearson 454, Podaril KL080*).

Thalloloma hypoleptum (Nyl.) Staiger.—(*Guccion 2378*).

Thecaria quassiicola Fée.—(*Seavey and Seavey 15320*).

Thelidium minutulum Körber.—(*Pearson 402a, Seavey and Seavey 15006*).

Tomasellia americana (Minks ex Willey) R. C. Harris.—(*Gagnon 2140, Seavey and Seavey 15468*).

Trapeliopsis granulosa (Hoffm.) Lumbsch.—Figure 20H. (*Pearson 438*). This is the most southerly appearance of the species in the United States. It was collected just once from a relict charred pine stump.

Trypethelium eluteriae Sprengel.—(*Gagnon 2030, 2042, 2102*, *Guccion 2341*, *Kaminsky DJ116*, *Pearson 399*, *Podaril KL135*, *Randall 1092*, *Seavey and Seavey 15221*). This was the most commonly collected species during the survey. But unlike *Clathroporina isidiifera* (see notes under that species) it occupies exposed sites, often in full harsh sunlight. Both species have perethecioid ascomata but those of *T. eluteriae* are completely immersed in pseudostromatic tissue filled with a yellow K+ purple substance, possibly as a protection from the harsh conditions of its most common habitat.

Verrucaria halizoa Leighton.—(*Randall 1138*).

Verrucaria riddleana R. C. Harris.—(*Kaminsky DJ117, Pearson 402b, Randall 1137, Seavey and Seavey 15003, 15208, 15504*). This is a very common species found throughout sites 1–3 on coral limestone. It compares fairly well with the protologue for *Verrucaria mamillaris* Riddle, now a synonym of the above (Britton and Millspaugh, 1920), matching in all external characteristics except the thallus is pale green instead of white. Internally, the ascospores of the Dagny material average slightly larger, 20–24 × 10–11 µm. The mamilliform apex of the perithecia described by Riddle is present in some of the Dagny collections but soon collapse leaving a flat or obtuse apex. The involucrellum is thick and distinct extending roughly half way down the perethecium with the basal part separating slightly from the exciple. Unfortunately, Riddle did not give details of this part of the lichen's anatomy. Harris (1995) included the taxon for Florida centered on a 19th century collection from Key West.

Zwackhia viridis (Pers. ex Ach.) Poetsch and Schied. Syn.: *Opegrapha viridis* (Pers. ex Ach.).—(*Podaril KL126*).

KEY T0 THE GENUS *GRAPHIS* ADAN. IN FLORIDA, USA

In an earlier version of the key to *Graphis* for the state of Florida (Seavey and Seavey, 2011), *Graphis chlorotica* A. Massal. was included and reported as new to North America. Barcenas Peña et al. (2014) reexamined that species and found previously published information concerning its thalline margin to be incorrect. Thus, the corrected identification for the Florida collection is *G. subtenella* Müll. Arg., which now should replace the former species on the North American lichen checklist.

KEY TO SECTIONS

For a definition of the morphotypes within the genus refer to Lücking et al. (2009).

1. Carbonized exciple absent, labia entire, hemithecioid, hymenium clear, ascospores transverse septate *Graphis*-like (I+ purple, locules lens shaped), 22–32 × 6–8 µm, norstictic acid present .... ***G. oshioi*** M. Nakan.
   Carbonized exciple present 2
2. Exciple carbonized apically .... Section One
   Exciple carbonized laterally or completely 3
3. Exciple carbonized laterally........ Section One
   Exciple carbonized completely........ Section Three

Graphis Section One:

1. Labia entire, disc closed, pruinose, hymenium clear, ascospores 20–40 × 6–10 µm, 5–9- septate .... ***G. xanthospora*** Müll. Arg.
   Labia striate 2
2. Ascospores muriform 3
   Ascospores transversely septate 5
3. With norstictic acid 4
   With no substances, ascospores 25–45 × 15–25 µm, 1–2 per ascus .... ***G. disserpens*** Nyl.
4. Ascospores medium, 30–60 × 17–25 µm........ ***G. antillarum*** Vain.
   Ascospores small, 20–45 × 10–17 µm .... ***G. perstriatula*** Nyl.
5. Ascospores small, 20–40 µm long 6
   Ascospores medium, 40–70 µm long 7

6. Ascomata with lateral thalline margin, sparsely branched, (*tenella* morph)....***G. subtenella*** Müll. Arg.
Ascomata with basal thalline margin, radially branched (*striatula* morph)..........***G. proserpens*** Vain.
7. Thallus yellowish green, lirellae prominent, thalline margin absent, ascospores 50–60 × 9–12 µm, 9–15-septate ....***G. caribica*** Lücking
Thallus grayish white, lirellae erumpent, thalline margin lateral to complete, ascospores 40– 60 × 9–13 µm, 9–13-septate ....***G. appendiculata*** Common and Lücking

***Graphis* Section Two:**

1. Labia striate.................... 2
Labia entire.................... 10
2. Thallus UV+ yellow, containing lichexanthone.................... 3
Thallus UV-, lichexanthone lacking.................... 4
3. Lirellae elongate, partly branched, ascospores 20–30 × 7–10 µm, 6–8-septate...***G. lucifica*** R. C. Harris
Lirellae short, rarely branched, ascospores 40–70 × 7–12 µm, 8–15-septate ....***G. haleana*** R. C. Harris
4. Ascospores submuriform to muriform.................... 5
Ascospores transversely septate.................... 8
5. Thallus with no substances ....***G. pseudoserpens*** Chaves, Lücking and Umaña
Thallus with norstictic acid.................... 6
6. Ascomata encrusted with anthraquinone crystals, K+ purple-red, ascospores submuriform, small, 20–35 × 10–15 µm ....***G. tamiamiensis*** Lendemer
Ascomata lacking K+ reactive crystals.................... 7
7. Thallus with additional stictic acid, thalline margin lateral, ascospores 25–40 × 12–14 µm ....***G. neoelongata*** Lücking
Thallus without additional metabolite, thalline margin complete, ascospores 40–48 × 14–19 µm ....***G. koltermaniae*** F. Seavey and J. Seavey
8. Thallus with norstictic acid, thalline margin thick, lateral, ascospores 25–38 × 5–8 µm ....***G. bungartzii*** B. Peña, Lücking, Campos and Miranda
Thallus with no substances.................... 9
9. Ascomata lacking thalline margin (*striatula* morph), ascospores 30–65 × 7–12 µm ....***G. striatula*** (Ach.) Spreng.
Ascomata with lateral thalline margin, (*tenella* morph), ascospores 15–30 × 6–8 µm ....***G. tenella*** Ach.
10. Hymenium inspersed.................... 11
Hymenium clear.................... 17
11. Thallus with norstictic or stictic acid.................... 12
Thallus with no substances.................... 15
12. Containing stictic acid, lirellae short, rarely branched, ascospores 20–40 × 6–8 µm ....***G. leptocarpa*** Fée
Thallus with norstictic acid.................... 13
13. Disc exposed, lirellae erumpent with lateral thalline margin.................... 14
Disc closed, lirellae erumpent with basal to lateral thalline margin, ascospores 25–40 × 6–8 µm ....***G. cincta*** (Pers.) Aptroot
14. Disc pruinose (*scripta* morph) ....***G. crebra*** Vain.
Disc epruinose (*handelii* morph) ....***G. handelii*** Zahlbr.

15. Lirellae 0.3–0.7 mm long, straight, unbranched, immersed singly in distinctly raised pseudostroma, ascospores 30–45 × 8–10 µm, 9–11-septate .... ***G. elevata*** F. Seavey and J. Seavey
    Lirellae 1–3 mm long, erumpent, not in raised pseudostroma.. 16
16. Ascospores 20–40 × 6–8 µm, 7–9-septate .... ***G. lineola*** Ach.
    Ascospores 40–55 × 8–12 µm, 11–17-septate .... ***G. intermedians*** Vain.
17. Ascospores muriform 18
    Ascospores transversely septate.. 21
18. Thallus with no substances 19
    Thallus with norstictic acid... 20
19. Disc exposed, reddish brown, ascospores densely muriform, 28–39 × 14–18 µm ....***G. ferrugineodisca*** F. Seavey and J. Seavey
    Disc closed, ascospores 60–90 × 20–25 µm .... ***G. xylophaga*** (R. C. Harris) Lendemer
20. Lirellae short to elongate, 1–4 mm long, sparsely branched, prominent, thalline margin basal or absent (*hossei* morph) .... ***G. analoga*** Nyl.
    Lirellae long, 1–8 mm long, richly branched, erumpent with lateral thalline margin (*deserpens* morph)... ***G. renschiana*** (Mull. Arg.) Stizenb.
21. Disc exposed 22
    Disc closed 24
22. Disc with orange crystals, reacting K+ purple, thallus with no substances, ascospores 23–30 × 6–7 µm .... ***G. inversa*** R. C. Harris
    Disc otherwise... 23
23. Thallus with no substances, ascospores 25–63 × 5–12 µm (see note below)........***G. scripta*** (L.) Ach.
    Thallus with norstictic acid, ascospores 32–46 × 6–12 µm................... ***G. pyrrhocheiloides*** Zahlbr.
24. Thallus with no substances, ascospores 20–40 × 7–12 µm 25
    Thallus with norstictic, stictic or protocetraric acid... 27
25. Thallus mostly ecorticate, lirellae thin, elongate, 1–5 mm long, thinly white pruinose .... ***G. furcata*** Fée
    Thallus corticate, ascomata epruinose 26
26. Ascospores small, 20–45 × 6–12 µm, 5–11-septate.. ***G. pinicola*** Zahlbr.
    Ascospores medium, 50–80 × 9–15 µm, 11–17-septate ....***G. elongata*** Zenker
27. Thallus with protocetraric acid, lirellae long, partly branched, pruinose ..***G. supracola*** A. W. Archer
    Thallus with norstictic or stictic acid 28
28. Thallus with stictic acid, lirellae long, partly to stellately branched, immersed, pruinose, ascospores 20–40 × 6–8 µm.. ***G. dendrogramma*** Nyl.
    Thallus with norstictic acid.. 29
29. Lirellae 3–10 mm long, richly to radially branched......................... ***G. filiformis*** Adaw. and Makhija
    Lirellae 1–3 mm long, sparsely to irregularly branched 30
30. Lirellae irregularly branched, labia white pruinose .... ***G. caesiella*** Vain.
    Lirellae unbranched to sparsely branched, labia epruinose ....***G. librata*** C. Knight

Note: Neuwirth and Aptroot (2011) divided *G. scripta* into four species based on morphological and microscopic traits. Their new concept of the species describes it as having closed or only very slightly open discs. This concept has not yet been applied to North American collections (Esslinger, 2015) Thus, we treat the species here in the historical concept as having open discs.

***Graphis* Section Three:**

1. Thallus containing lichexanthone, UV+ yellow, lirellae prominent with basal thalline margin, ascospores 45–60 × 10–14 µm .... ***G. sauroidea*** Leight.
   Thallus lacking lichexanthone, UV– 2
2. Disc exposed, KOH– or KOH+ purple 3
   Disc closed 5
3. Disc tardily exposed with orange crystals, K+ purple in section, thallus with norstictic acid, ascospores 25–35 × 7–8 µm .... ***G. chromothecia*** R. C. Harris
   Disc without orange coloration, K– in section, pruinose 4
4. Thallus with norstictic acid, hymenium inspersed .... ***G. aperiens*** Mull. Arg.
   Thallus with stictic acid, hymenium not inspersed .... ***G. modesta*** Zahlbr.
5. Labia striate 6
   Labia entire 15
6. Hymenium inspersed 7
   Hymenium not inspersed 11
7. Ascospores transversely septate 8
   Ascospores at least partly muriform, thallus with no substances 9
8. Thallus containing norstictic and stictic acid, ascospores 33–40 × 7–8 µm, 7–9-septate, lirellae forming in pale brown pseudostromata .... ***G. hinnulea*** F. Seavey and J. Seavey
   Thallus with no substances, ascospores 48–65 × 7–10 µm, 12–15-septate, 2–4 per ascus (see note below) .... ***G. cupei*** Vain. ex Lücking
9. Ascospores terminally muriform (a few end cells muriform, the rest transversely septate), 60–120 × 12–20 µm, lirellae prominent with complete thalline cover (see note below) .... ***G. subflexibilis*** Lücking and Chaves
   Ascospores completely muriform, medium to large, prominent, with complete thalline cover 10
10. Ascospores large, 80–140 × 15–25 µm, 2–8 per ascus .... ***G. argentata*** Lücking and Umaña
    Ascospores medium sized, 50–70 × 9–12 µm, 8 per ascus .... ***G. pseudocinerea*** Lücking
11. Ascospores muriform, 80–170 × 15–30 µm, 2–6 per ascus (presence in Florida was based on a sterile collection from Fakahatchee Strand State Preserve, see note below) .... ***G.*** cf***. acharii*** Fée
    Ascospores transversely septate 12
12. Thallus with norstictic acid 13
    Thallus with no substances 14
13. Lirellae gracile, immersed to erumpent with lateral thalline margin, ascospores 20–30 × 7–9 µm .... ***G. schiffneri*** Zahlbr.
    Lirellae robust, prominent with basal thalline margin, ascospores 27–37 × 8–10 µm .... ***G. paralleloides*** Cáceres and Lücking
14. Lirellae erumpent with lateral thalline margin, ascospores 50–70 × 7–13 µm, 11–17-septate .... ***G. longula*** Kremp.
    Lirellae erumpent, thalline margin absent, ascospores 30–50 × 7–13 µm, 7–11-septate .... ***G. rimulosa*** (Mont.) Trevis.
15. Hymenium inspersed 16
    Hymenium not inspersed 21
16. Thallus containing norstictic acid, lirellae erumpent, thalline margin absent 17
    Thallus containing no substances 18
17. Ascospores 23–38 × 5–8 µm, 5–9-septate .... ***G. desquamescens*** (Fée) Zahlbr.
    Ascospores 38–66 × 8–11 µm, 9–14-septate, often with knob tips .... ***G. brittoniae*** F. Seavey and J. Seavey

18. Ascospores transversely septate 19
    Ascospores muriform or terminally muriform 20
19. Ascospores 25–45 × 7–9 µm, 7–11 septate, 8 per ascus, thalline margin absent .... ***G. anfractuosa*** (Eschw.) Eschw.
    Ascospores 48–65 × 7–10 µm, 12–15-septate, 2–4 per ascus .... ***G. cupei*** Vain. ex Lücking
20. Ascospores terminally muriform (a few end cells muriform, the rest transversely septate), 60–120 × 12–20 µm, lirellae prominent with complete thalline cover .... ***G. subflexibilis*** Lücking and Chaves
    Ascospores completely muriform, large, 80–140 × 15–25 µm, 2–8 per ascus .... ***G. argentata*** Lücking and Umaña
21. Lirellae pruinose, stellately arranged in pseudostromatic tissue .... ***G. hyphosa*** Staiger
    Lirellae not in pseudostroma, ascospores transversely septate 22
22. Lirellae sessile without thalline margin, epruinose, straight, unbranched, ascospores 25–45 × 7–13 µm .... ***G. conferta*** Zenker
    Lirellae immersed to prominent but not sessile, branched, thalline margin present, ascospores narrower 23
23. Lirellae prominent with thick basal to lateral thalline margin, thallus uneven but not verrucose, ascospores 30–45 × 5–7 µm, 9–11-septate .... ***G. oxyclada*** Müll. Arg.
    Lirellae immersed to erumpent with thinner lateral thalline margin, thallus verrucose, ascospores 20–30 × 5–8 µm, 5–7-septate .... ***G. stellata*** Cáceres and Lücking

Note: In the case of *Graphis cupei*, and *G. subflexilis*, first generation lirella will often appear to be entire or the striation difficult to detect. These taxa have been included on both sides of the key to avoid misidentifications.

KEY TO NORTH AMERICAN *PHAEOGRAPHIS* MÜLL. ARG.

1. Ascospores submuriform to muriform 2
   Ascospores transversely septate 11
2. Thallus with norstictic acid 3
   Thallus with no substances 8
3. Ascospores greater than 70 µm long 4
   Ascospores less than 50 µm long 5
4. Lirellae elongate to substellate, discs black, ascospores 100–135 × 30–45 µm, 1 per ascus .... ***P. atromaculata*** (A. W. Archer) A. W. Archer
   Lirellae rounded, discs brown, ascospores 90–150 × 25–35 µm, thallus with additional connorstictic acid, apparently limited to North Carolina barrier islands .... ***P. oricola*** Lendemer and R. C. Harris
5. Lirellae in broad, decorticate pseudostroma-like patches, ascospores submuriform, 20–30 × 7–10 µm .... ***P. pseudostromatica*** F. Seavey and J. Seavey
   Lirellae not in pseudostroma nor in decorticate parts of the thallus 6
6. Ascospores submuriform, 15–20 × 7–9 µm, hymenium clear .... ***P. leiogrammodes*** (Kremp.) Müll. Arg.
   Ascospores submuriform to muriform, greater than 25 µm long, hymenium inspersed 7
7. Lirellae radially branched, exciple carbonized laterally, ascospores submuriform to muriform, 30–40 × 12–14 µm .... ***P. radiata*** F. Seavey and J. Seavey
   Lirellae elongate, partly branched, exciple uncarbonized, ascospores muriform, 25–45 × 11–18 µm .... ***P. quadrifera*** (Nyl.) Staiger

8. Ascospores 85–150 × 25–40 µm, 1 per ascus ..... ***P. scalpturata*** (Ach.) Staiger
Ascospores 20–45 × 7–15 µm 9
9. Ascospores submuriform, 20–30 × 7–10 µm long, disc slit-like, hymenium inspersed
..... ***P. dividens*** (Nyl.) Kr.P. Singh and Swarnalatha
Ascospores muriform, 25–45 × 8–15 µm long, disc exposed 10
10. Thallus ecorticate, exciple carbonized apically, hymenium inspersed ..... ***P. tortuosa*** (Ach.) Müll. Arg.
Thallus corticate, exciple uncarbonized, hymenium clear ..... ***P. asteroides*** (Fink) Lendemer
11. Ascospores consistently 3-septate 12
Ascospores with at least some greater than 3-septate 16
12. Thallus with stictic acid, exciple uncarbonized, ascospores 13–17 × 5–7 µm
..... ***P. delicatula*** Common and Lücking
Thallus with norstictic acid 13
13. Lirellae densely branched, arranged in white pseudostromatic tissue, ascospores 14–23 × 57 µm
..... ***P. brasiliensis*** (A. Massal.) Kalb and Matthes-Leicht
Lirellae not arranged in pseudostromatic tissue 14
14. Exciple completely carbonized, lirellae stellately branched, disc exposed .. ***P. dendriticella*** Müll. Arg.
Exciple carbonized apically, lirellae not stellately branched, disc exposed or slit-like 15
15. Ascospores very small, 10–13 × 5–6 µm, disc exposed ..... ***P. inconspicua*** (Fée) Müll. Arg.
Ascospores larger, 14–21 × 6–9 µm, disc slit-like ..... ***P. subfulgurata*** (Nyl.) Zahlbr.
16. Ascospores consistently 5-septate 17
Ascospores otherwise 21
17. Thallus with no substances, ascospores 16–20 × 8–10 µm, lirellae slit-like, epruinose
..... ***P. arthonioides*** (Vain.) Zahlbr.
Thallus with stictic or norstictic acid 18
18. Thallus with stictic acid, lirellae immersed in yellowish pseudostromata, ascospores 20–25 × 6–8 µm
..... ***P. flavescens*** Dal Forno and Eliasaro
Thallus with norstictic acid 19
19. Thallus with additional lichexanthone (UV+ yellow), lirellae short, round to oval, 0.3–1.0 mm long
..... ***P. punctiformis*** (Eschw.) Müll. Arg.
Thallus without lichexanthone 20
20. Lirellae long, stellately branched, hymenium clear, exciple uncarbonized .. ***P. major*** (Kremp.) Lücking
Lirellae partly branched, never stellate, hymenium inspersed, exciple carbonized apically
..... ***P. nylanderi*** (Vain.) Zahlbr.
21. Ascospores mostly greater than 25 µm long 22
Ascospores mostly less than 25 µm long 27
22. Ascomatal disc red, proper margin dark red, containing isohypocrelline (K+ green effusion),
ascospores 22–36 µm long, 5–9-septate ..... ***P. haematites*** (Fée) Müll. Arg.
Ascomatal disc not red, chemistry otherwise 23
23. Thallus with norstictic acid 24
Thallus with no substances 26
24. Hymenium inspersed, yellow with K+ purple anthraquinone, ascospores consistently 7- septate,
30–40 × 8–11 µm long ..... ***P. multicolor*** R. C. Harris
Not as above 25
25. Ascospores 5–11-septate, exciple thinly, completely carbonized, thallus ecorticate
..... ***P. dendritica*** (Ach.) Müll. Arg.
Ascospores 5–7- septate, exciple laterally carbonized, thallus corticate .... ***P. smithii*** (Leight.) De Lesd.

26. Ascospores 5–11-septate, ascomata round often with thin, papery, raised proper margins, disc blackish, ascospores 25–45 × 7–10 µm long .... ***P. lobata*** (Eschw.) Müll. Arg.
    Ascospores 5–7-septate, ascomata lirelliform, elongate, prominent, with lobulate thalline margin, ascospores 25–30 x 7–8 µm long..***P. erumpens*** (Nyl.) Müll. Arg.
27. Thallus with no substances, hymenium inspersed, ascospores 13–25 × 5–8 µm long, 3–5-septate ....***P. inusta*** (Ach.) Müll. Arg.
    Thallus with norstictic or stictic acid 28
28. Thallus with stictic acid, hymenium clear, ascospores 14–25 × 6–11 µm long, 5–7-septate ....***P. schizoloma*** (Müll. Arg.) Müll. Arg.
    Thallus with norstictic acid 29
29. Ascomata in weak decorticate to pseudostromatic-like patches, hymenium clear, exciple uncarbonized..***P. intricans*** (Nyl.) Staiger
    Ascomata not pseudostromatic, hymenium inspersed, exciple carbonized apically, (see note below) ....***P. nylanderi*** (Vain.) Zahlbr.

Although all of the South Florida collections of *P. nylanderi* we have viewed are consistently 5-septate, some of the literature describes the ascospores as 3–5-septate. Thus the species has been keyed with both eventualities as couplet 29 is inserted in case other than 5-septate ascospores are encountered.

WORLD KEY TO *PLATYGRAMME* FÉE

1. Ascospores transversely septate.. 2
   scospores submuriform or muriform 6
2. Thallus with no substances 3
   Thallus with stictic acid... 5
3. Hymenium yellow, K+ purple (anthraquinone), ascospores 25–35 × 8–10 µm ....***P. coccinea*** F. Seavey and J. Seavey
   Hymenium hyaline, K– 4
4. Ascospores 65–75 × 12–14 µm, 10–18-celled..................................***P. praestans*** (Müll. Arg.) Staiger
   Ascospores 33–36 × 8–10 µm, 6-celled .... ***P. computata*** (Kremp.) A. W. Archer
5. Lirellae erumpent, radially branched, lacking thalline margin, ascospores 15–25 × 5–8 µm, 4–7-celled, with additional constictic acid..***P. discurrens*** (Nyl.) Staiger
   Lirellae prominent. partly branched, with lateral thalline margin, ascospores 12–20 × 6–8 µm, with additional peristictic acid..***P. microspora*** J. Sutjaritturakan and K. Kalb
6. Thallus with norstictic acid 7
   Thallus with echinocarpic acid or no substances 8
7. Exciple with apical wedge-shaped carbonization, ascospores 30–50 µm long ....***P. pachnodes*** (Fée) E. Tripp and Lendemer
   Exciple with thick lateral carbonization, ascospores 29–34 µm long ....***P. elegantula*** F. Seavey and J. Seavey
8. Thallus with echinocarpic acid 9
   Thallus with no substances.. 10
9. Exciple with apical wedge-shaped carbonization, ascospores 125–160 × 25–42 µm ....***P. pseudomontagnei*** (M. Nakan.) M. Nakan. and Kashiw.
   Exciple with uniform lateral carbonization, ascospores 160–180 × 16–25 µm .... ***P. pudica*** (Mont. and Bosch) M. Nakan. and Kashiw.

10. Ascospores less than 25 µm long 11
    Ascospores greater than 25 µm long 12
11. Disc concealed, ascospores muriform, 13–18 × 6–10 µm, 4 × 2-locular .... ***P. fuscescens*** (A.W. Archer) A.W. Archer
    Disc open, black, ascospores submuriform, 18–24 × 8–11 µm, 6 × 1–2-locular ... ***P. buxi*** (Etayo) Etayo
12. Ascospores 25–50 µm long 13
    Ascospores greater than 50 µm long 16
13. Ascospores muriform with 5 or less transverse septa, 25–35 × 11–16 µm, exciple carbonized laterally .... ***P. arechavaletae*** (Mull. Arg.) A. W. Archer
    Ascospores submuriform or muriform, with greater than 7 transverse septa, exciple carbonized apically 14
14. Ascospores submuriform, 25–45 × 10–12 µm, with 10–15 transverse septa, disc concealed .... ***P. subarechavaletae*** V. Poengsungnoen and K. Kalb
    Ascospores muriform, disc open, brown or black 15
15. Ascospores 2 per ascus, 35–45 × 11.0–15.5 µm, 9–10 × 2–4-locular ..... ***P. lueckingii*** Z. F. Jia and Kalb
    Ascospores 8 per ascus, 30–50 × 6.5–13 µm........ ***P. hainanensis*** Z. F. Jia and Kalb
16. Asci 1-spored 17
    Asci 2–8-spored 21
17. Ascospores less than 100 µm long 18
    Ascospores greater than 100 µm long 20
18. Lirellae striate, prominent, thickly white pruinose, ascospores 40–75 × 14–18 µm .... ***P. australiensis*** Staiger
    Lirellae entire, epruinose or only thinly pruinose 19
19. Lirellae prominent, 2–6 mm long, epruinose, ascospores 80–100 × 24–30 µm (see note below) .... ***P. commutabilis*** (Kremp.) A.W. Archer
    Lirellae erumpent, 1–3 mm long, thinly white pruinose, ascospores 55–70 × 15–22 µm .... ***P. unirana*** M. Cáceres, Aptroot and Lücking
20. Lirellae prominent, pruinose, unbranched, with complete thalline margin, exciple apically carbonized, ascospores 110–180 × 18–40 µm .... ***P. muelleri*** (A.W.Archer) Staiger
    Lirellae erumpent, epruinose, partly branched, with lateral thalline margin, exciple carbonized apically and laterally, ascospores 120–180 × 25–35 µm .... ***P. platyloma*** (Müll.Arg.) M.Nakan. and Kashiw.
21. Exciple carbonized apically and basally leaving lateral part uncarbonized, ascospores 60–75 × 17–19 µm .... ***P. reticulata*** Fée
    Exciple carbonized apically or apically and laterally but never basally 22
22. Ascospores submuriform 50–80 × 12–18 µm .... ***P. pachyspora*** (Redinger) Staiger
    Ascospores muriform 60–115 × 17–34 µm 23
23. Asci 2–5-spored, hymenium often I+ blue at least in part, ascospores densely muriform, 22–31 × 6–8-locular, 80–115 × 18–34 µm .... ***P. colubrosa*** (Nyl.) Staiger
    Asci 8-spored, hymenium I-, ascospores muriform, 13–20 × 2–5 locular, 60–105 × 15–22 µm .... ***P. caesiopruinosa*** (Fée) Fée

The following taxa have been excluded from the above key as the description on which the identifications are based is too sparse to determine if they belong to *Platygramme* as currently defined. Furthermore, the Global Biodiversity Information Facility records no occurrence datasets for any of these except a single collection of *P. flexuosa* from Malaysia possibily named by Fée from a bark fragment sent to him. The type collection is missing.

Platygramme nigrocincta Fée, *Bull. Soc. bot. Fr.* 21: 30 (1874)
Platygramme vermiformis Fée, *Bull. Soc. bot. Fr.* 21: 29 (1874)
Platygramme epiphylla Fée, *Bull. Soc. bot. Fr.* 21: 30 (1874)
Platygramme heteromorpha Fée, *Bull. Soc. bot. Fr.* 21: 30 (1874)
Platygramme crassa Fée, *Bull. Soc. bot. Fr.* 21: 30 (1874)
Platygramme flexuosa Fée, *Bull. Soc. bot. Fr.* 21: 30 (1874)

Other excluded taxa:
Platygramme serograpta Spreng = *Lecanactis serograpta* (Spreng.) Mont.
Platygramma mucronata (Stirt.) A.W. Archer = *Halegrapha mucronata* (Stirt.) Lücking
Platygramme impudica (A.W. Archer) A.W. Archer = Syn. of *P. platyloma (*Müll. Arg.) M. Nakan. and Kashwi.

NEOTROPICAL KEY TO *STIRTONIA*

1. Thallus or ascomata with secondary chemicals 2
Thallus and ascomata without secondary chemicals 9
2. Thallus with gyrophoric acid, ascospores 35–40 × 10–2 µm, 8–12-celled ....***S. neotropica*** Aptroot
Thallus with different chemistry 3
3. Thallus or ascomata with perlatolic acid....................4
Thallus with different chemistry 6
4. Ascospores isolocular or mid-cells slightly larger, ascospores 35–55 × 12–19 µm, 8–12-celled, often falcate ....***S. curvata*** Aptroot
Ascospores macrocephallic 5
5. Ascospores 22–28 ×10–12 µm, thallus byssoid.................... ***S. byssoidea*** F. Seavey & J. Seavey
Ascospores 38–60 × 14–22 µm, thallus shiny....................***S. alba*** Makhija & Patw.
6. Thallus with divaricatic acid, ascospores 63–70 × 24–27 µm, 9–11-celled, mid-cells larger ....***S. divaricatica*** F. Seavey & J. Seavey
Thallus or ascomata with lichexanthone 7
7. Ascospores 68–79 × 18–28 µm, end cells larger .... ***S. nitida*** Xavier-Leite, M.Cáceres & Aptroot
Ascospores less than 60 µm long 8
8. Lichexanthone present in thallus, ascospores 17–19 × 8–10 µm .... ***S. lucida*** M. M. E. Alves, Aptroot & M. Cáceres
Lichexanthone present only in ascigerous area, ascospores 27–32 × 9.5–12.5 mm ....***S. ibirapuitensis*** Aptroot, Käffer & S. M. Martins
9. Ascospores less than 50 µm long 10
Ascospores greater than 50 µm long 13
10. Ascospores less than 30 um long, 8 or less cells.................... 11
Ascospores 35–50 um long, 10 or more cells 12
11. Ascospores macrocephalic, 23–27.5 × 9–10.5 µm, 5-celled .... ***S. microspora*** Xavier-Leite, M. Caceres & Aptroot
Ascospores isolocular, 15–30 × 6–8 µm, 6–8-celled....................***S. dubia*** A. L. Sm.
12. Thallus ecorticate, ascospores 40–45 × 15–16 mm, broadly ellipsoid ....***S. coei*** F. Seavey & J. Seavey
Thallus corticate, ascospores 35–47 × 11–14 µm, fusiform ....***S. nivea*** Xavier-Leite, M. Cáceres & Aptroot
13. Ascospores greater than 60 µm long.................... 14
Ascospores less than 60 µm long.................... 15

14. Ascospores 88–116 × 29–36 µm, 13–17-celled, ... ***S. macrocarpa*** Makhija & Patw.
 Ascospores 61–73 × 27–35 µm, 10–12-celled.............................. ***S. punctiformis*** Aptroot &Sipman
15. Ascospores 6–8-celled, 50–58 × 20–22 µm, I–.....***S. viridis*** Aptroot, L. Ferraro, Sipman & M. Cáceres
 Ascospores 10–12-celled, I+ brown or yellow 16
16. Ascospores generally 10-celled, 47–55 × 14–20 µm, I+ brown, interascal hyphae I–
 .... ***S. ochracea*** M. M. E. Alves,Aptroot & M. Cáceres
 Ascospores 10–12-celled, 52–55 × 20–23 um, I+ golden yellow, interascal hyphae I+ blue
 .... ***S. latispora*** F. Seavey & J. Seavey

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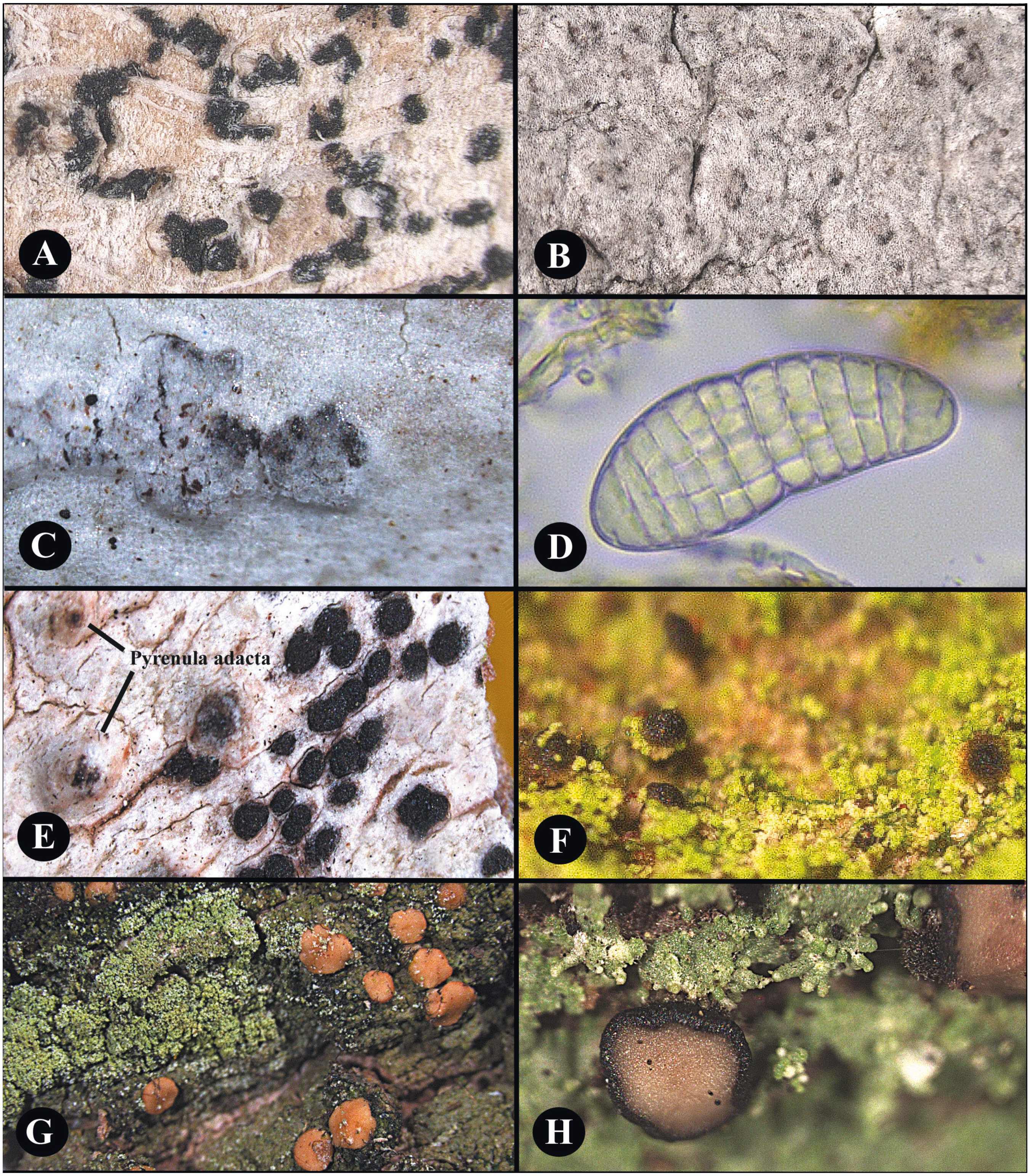

Figure 15. **A,** *Arthonia microsperma*. **B,** *Arthonia hypochniza.* **C,** Black punctiform apothecia of unknown *Arthonia.* **D,** Ascospore of unknown *Arthonia* in Figure 15C. **E,** *Arthonia tavaresii* lichenicolous on *Pyrenula adacta*. **F,** "*Aspidothelium*" sp. **G,** *Bacidia* sp. **H,** *Bacidiopsora orizabana* with isidioid outgrowths.

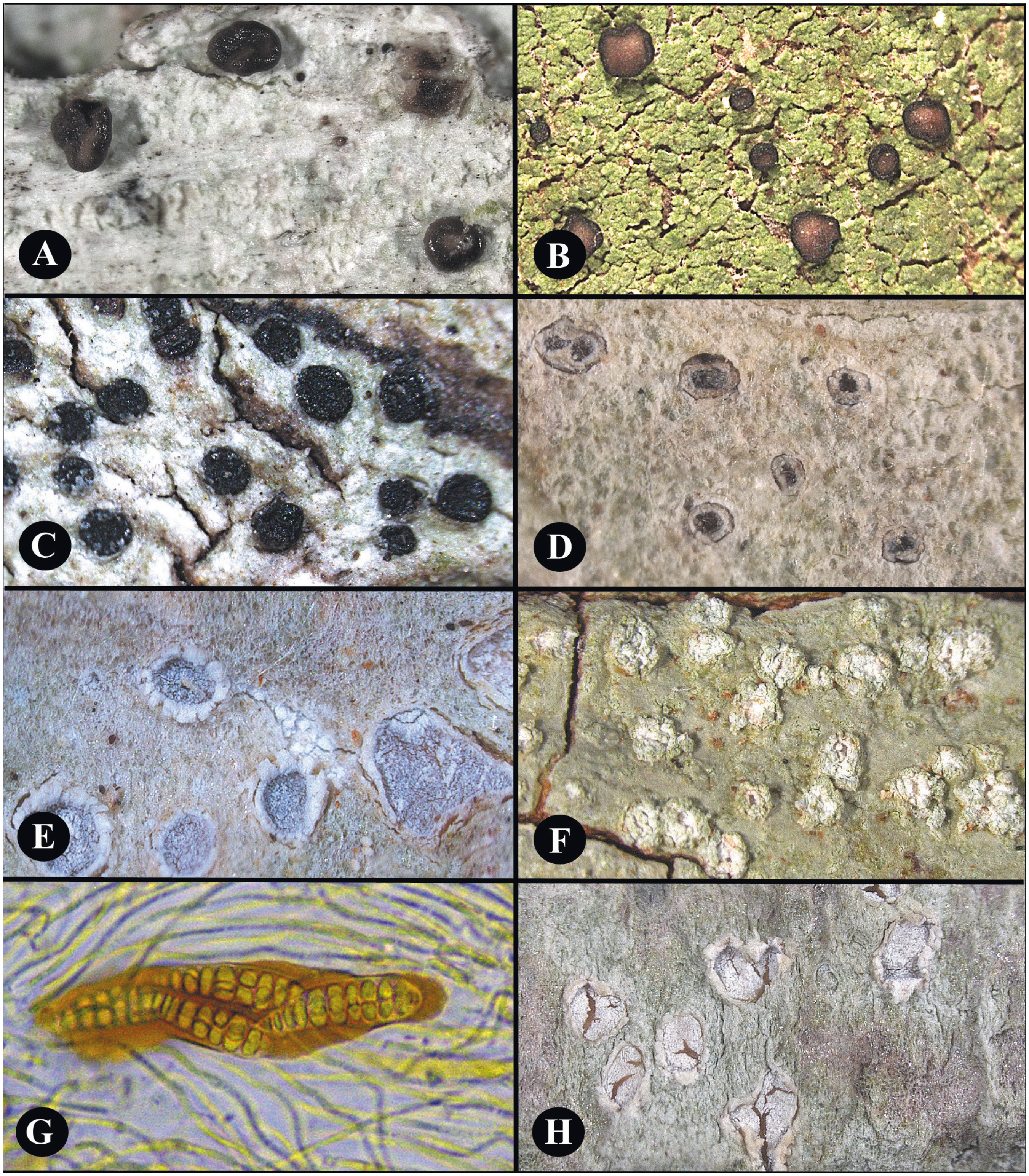

Figure 16. A, *Bacidina crystallifera.* **B,** *Bacidina squamellosa.* **C,** *Baculifera micromera.* **D,** *Chapsa boninensis.* **E,** *Chapsa elongata*. **F,** *Chapsa paralbida.* **G,** Ascospores of *Chapsa paralbida*. **H,** *Chapsa phlyctidioides*.

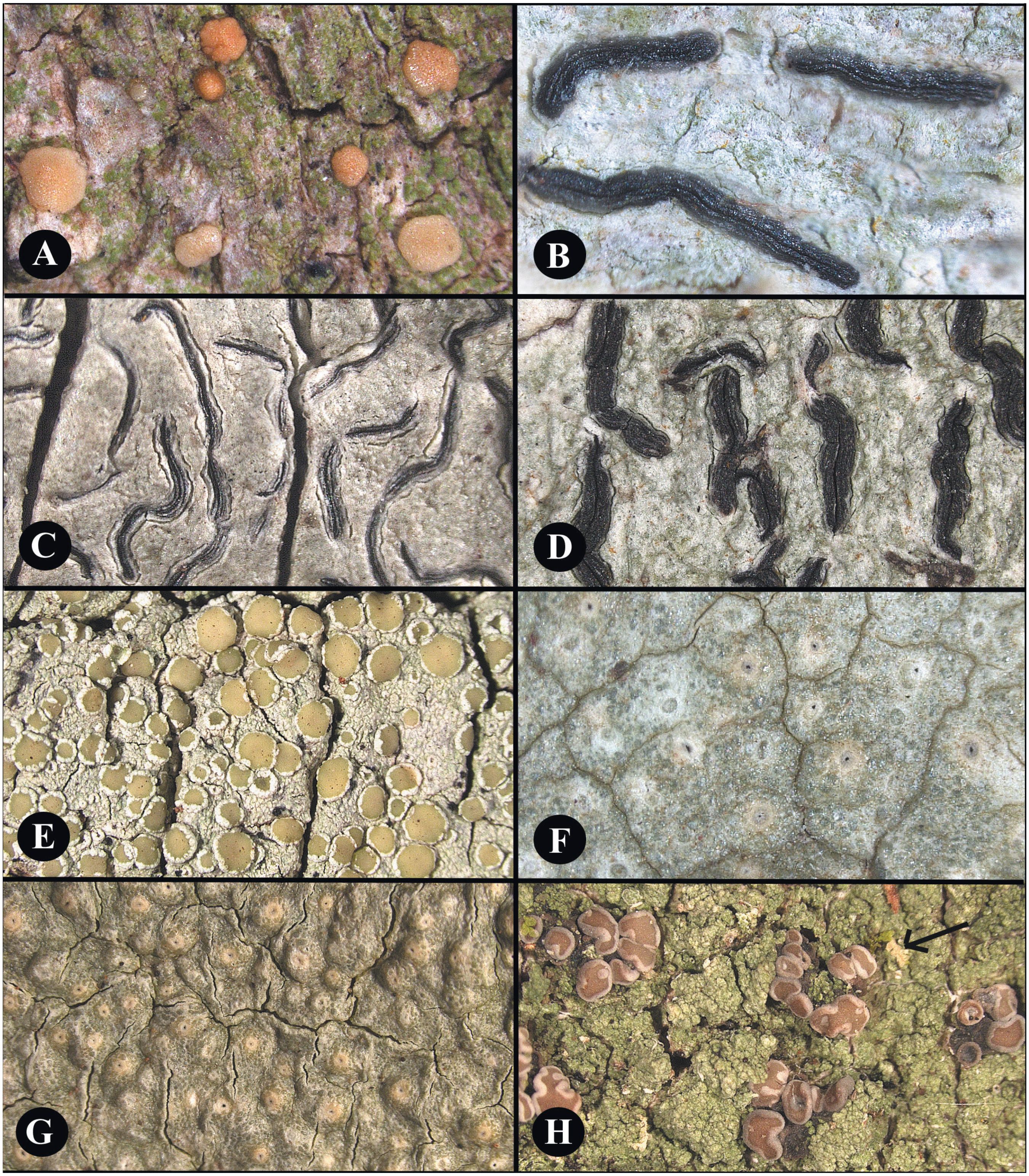

Figure 17. A, *Coenogonium pyrophthalmum*. **B,** *Graphis bungartzii*. **C,** *Graphis perstriatula.* **D,** *Graphis pseudoserpens*. **E,** *Lecanora substrobilina*. **F,** *Leucodecton compunctum*. **G,** *Leucodecton fissurinum*. **H,** *Malmidea cineracea*, arrow shows exposed yellowish medullary tissue.

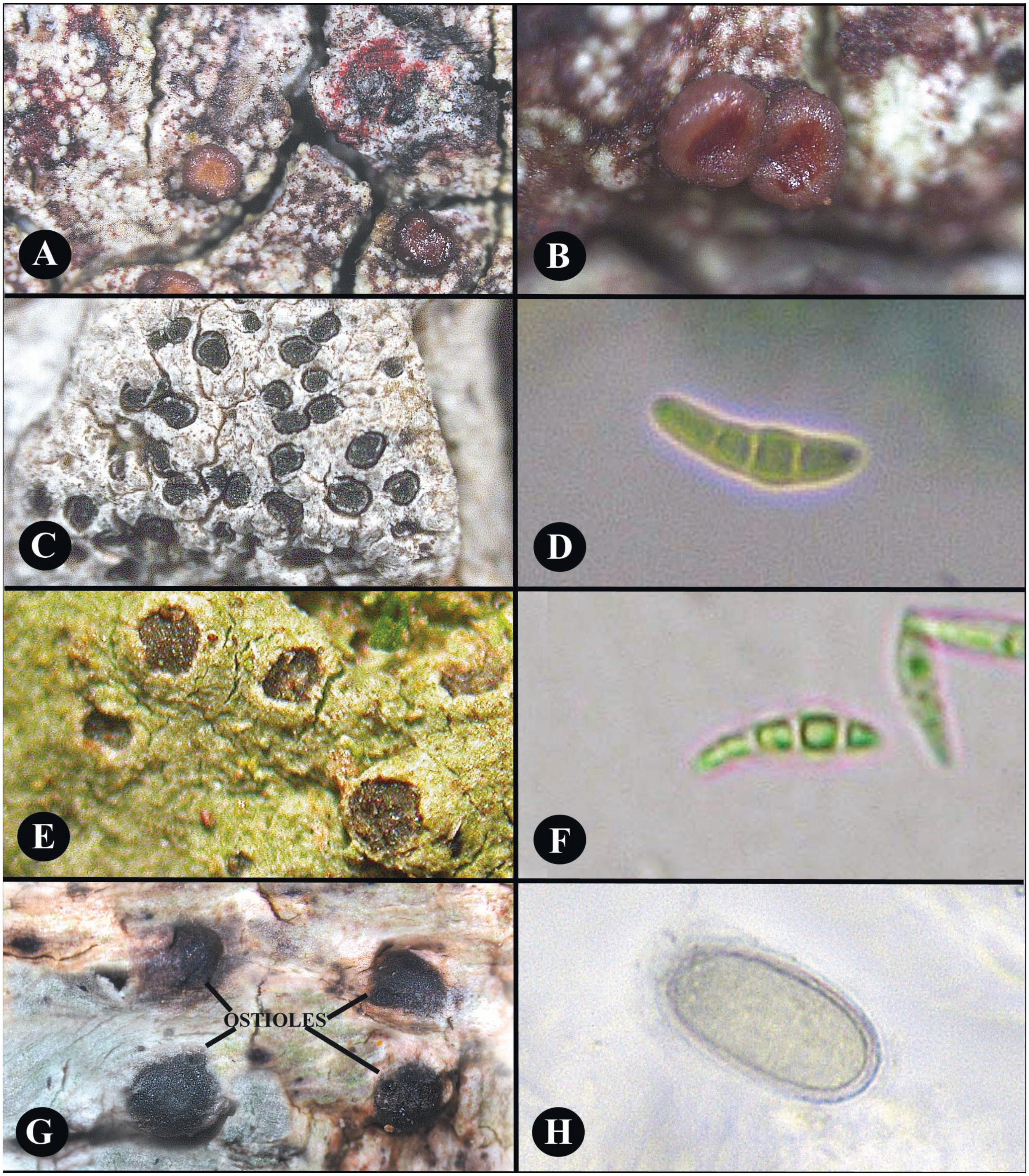

Figure 18. A–B, *Marchandiomyces buckii*. **C,** *Mazosia carnea*. **D,** Ascospore of *Mazosia carnea.* **E,** *Mazosia viridescens*. **F,** Ascospores of *Mazosia viridescens*. **G,** *Monoblastia palmicola*, note lateral ostioles. **H,** Ascospore of *Monoblastia palmicola.*

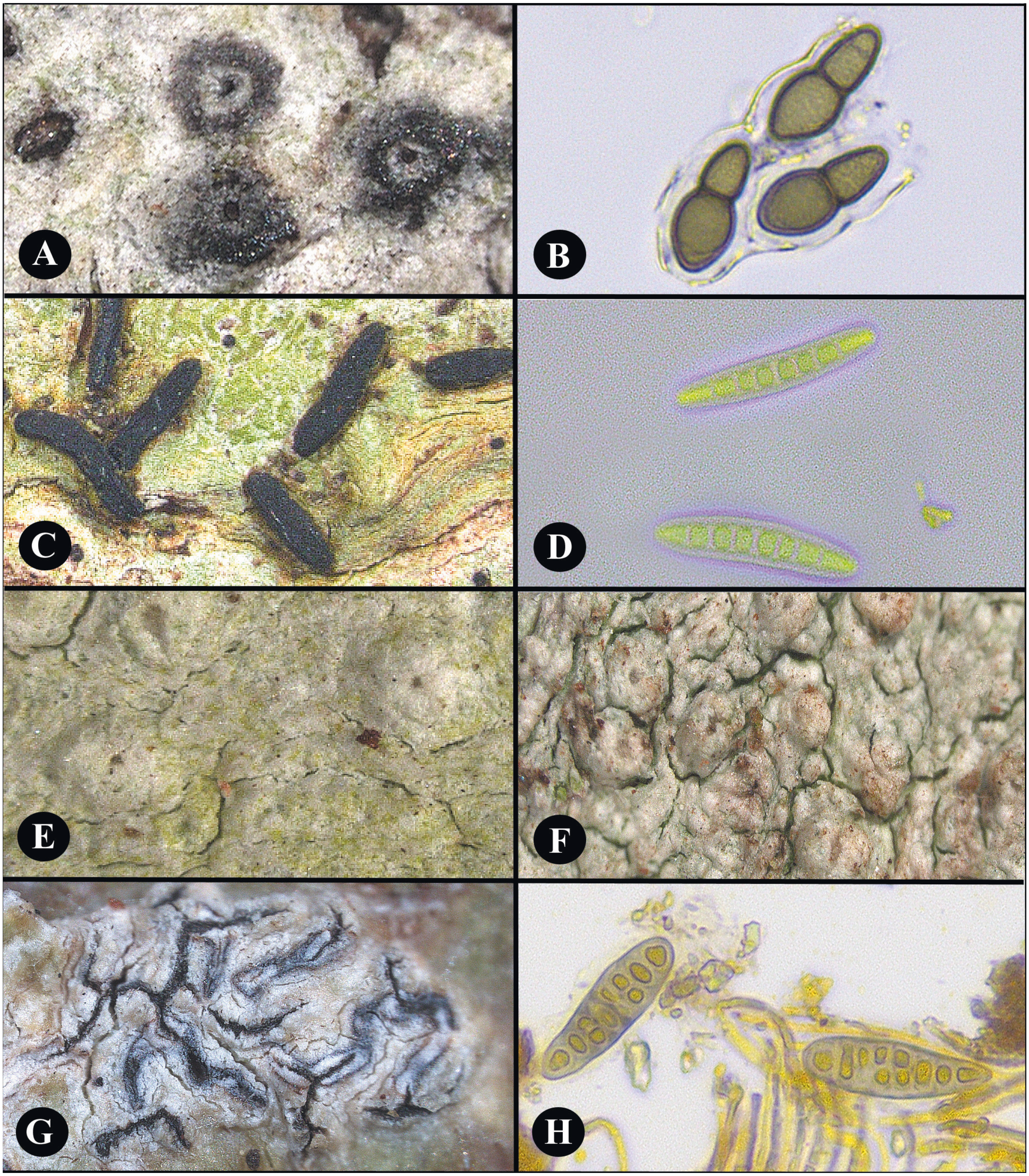

Figure 19. A, *Mycomicrothelia apposita*. **B,** Ascospores of *Mycomicrothelia apposita*. **C,** *Opegrapha* sp. **D,** Ascospores of unknown *Opegrapha.* **E,** *Pertusaria rigida*. **F,** *Pertusaria subrigida*. **G,** *Phaeographis dividens*. **H,** Ascospores of *Phaeographis dividens*.

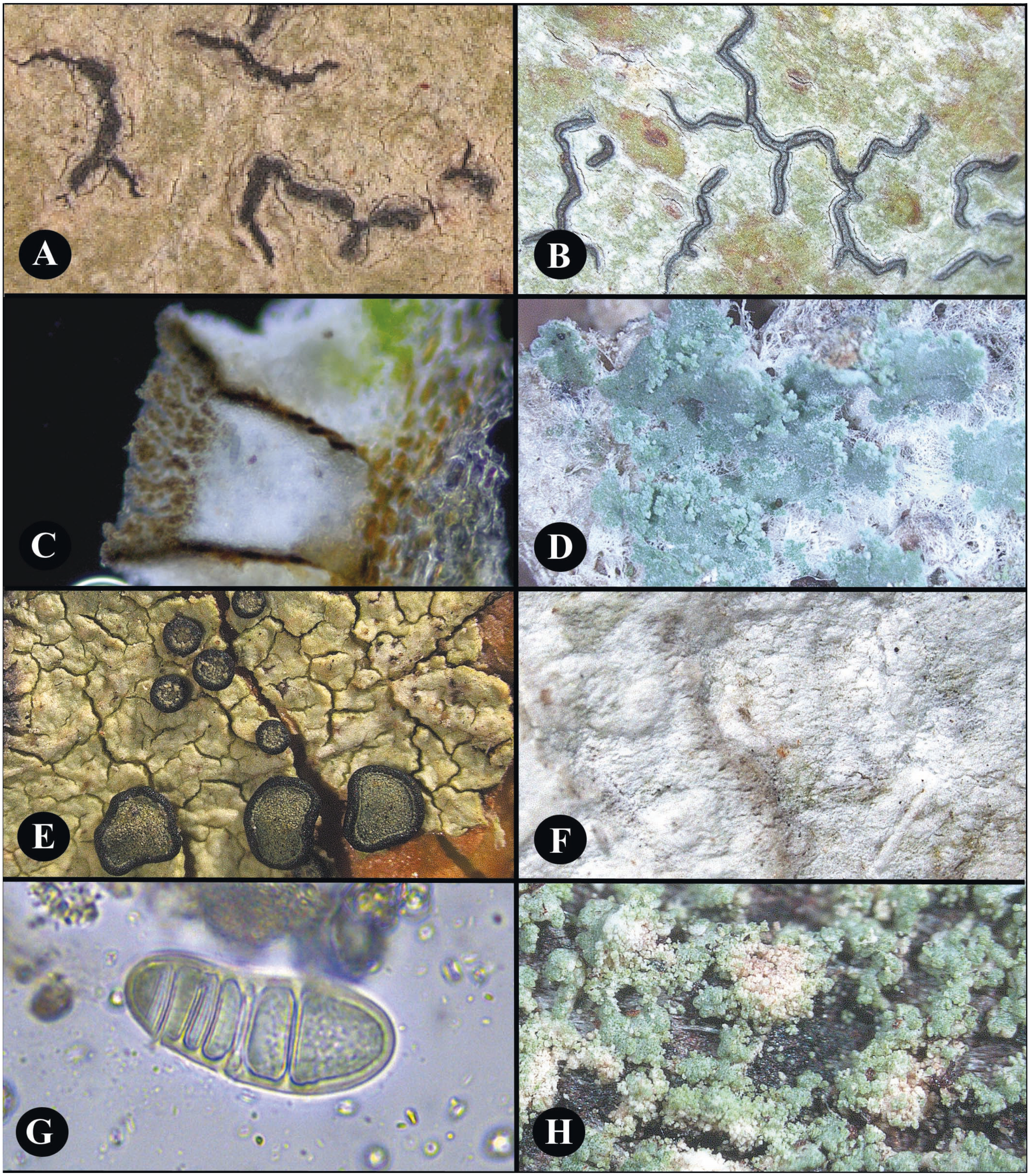

Figure 20. A, *Phaeographis quadrifera*. **B,** *Phaeographis sp.* **C,** Thin section of *Phaeographis* sp. with thin lateral carbonization. **D,** *Phyllopsora glaucescens*. **E,** *Stigmatochroma gerontoides*. **F,** *Stirtonia alba*. **G,** Ascospore of *Stirtonia alba*. **H,** *Trapeliopsis granulosa*.