

A new species and new records of *Cercophora* from Argentina

Myriam del Valle Catania

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Abstract: Three species of *Cercophora* were found during a survey of the biodiversity of microfungi in northwest Argentina. *Cercophora argentina* possesses a unique combination of morphological characters and is described as a new species, while *C. costaricensis* and *C. solaris* are reported as new records for Argentina. Other species of *Cercophora* known from this region include *C. natalita* and *C. coprogena*, which is fully illustrated for the first time and determined herein to be a synonym of *C. californica*. All other species are described and illustrated.

Key words: Lasiosphaeriaceae, *Podocarpus parlatoarei*, *Sambucus nigra*, Sordariales, systematics, Yungas

INTRODUCTION

Cercophora Fuckel is characterized morphologically by large, membranaceous to carbonaceous, ostiolate, papillate ascomata; asci with an apical ring usually with a subapical globule and ascospores with a brown, swollen head and a hyaline pedicel at maturity. Its most common anamorphs are found in the form genera *Phialophora* (Udagawa and Muroi 1979), *Cladorrhinum* (von Arx 1981) and *Chrysosporium* (Ueda 1994). Species in the genus can be coprophilous (Lundqvist 1972), xylophilous (Hilber and Hilber 1979) or less frequently are found on soil or in aquatic habitats (Ueda 1994, Chaudhary et al. 2007). *Cercophora* presently comprises 67 taxa, ac-

ording to Index Fungorum (www.indexfungorum.org, 7 Feb 2011).

Miller and Huhndorf (2005) showed that *Cercophora* and other sordariaceous genera are paraphyletic or polyphyletic and concluded that the peridium anatomy is a better indicator of phylogenetic relationships than ascospore morphology in some cases. With respect to the southern cone of South America only *Cercophora sordariooides* (Speg.) N. Lundq. on dung and *Cercophora natalitia* (Speg.) N. Lundq. on a dead trunk had been reported from Argentina, while *Cercophora coprogena* (Speg.) N. Lundq. on dung had been reported from Chile (Lundqvist 1972). Three species of *Cercophora* were found during our biodiversity studies on Argentinian microfungi occurring on bark and decorticated wood of a native gymnosperm, *Podocarpus parlatoarei* Pilg. One of these possesses a unique combination of characters not known in any other species in the genus and thus is described as new. Two additional *Cercophora* species are reported and illustrated from Argentina for the first time, while type specimens of three other species known from this area are fully illustrated for the first time.

MATERIALS AND METHODS

Collections were made in a *Podocarpus parlatoarei* forest and in a mixed forest from Cumbres de Taficillo, Sierra de San Javier, Departamento Tañi Viejo, Tucumán province, Argentina. The study area belongs to the District Mountain Forest of the phytogeographical region of Las Yungas, a subtropical zone of the Amazonic Domain, Neotropical Region, which encompasses the Andes from Venezuela and Colombia, entering the northwestern part of Argentina as a narrow section through Jujuy in the north to Salta, Tucumán and finally Catamarca provinces in the south (Cabrera and Willink 1973, Hueck 1978). Fallen stems of *Podocarpus parlatoarei* Pilg. and *Sambucus nigra* L. ssp. *peruviana* (Kunth) R. Bolli containing ascomata were collected. The material was dried and deposited in the herbaria of Fundación Miguel Lillo (LIL) and the Illinois Natural History Survey (ILLS).

Observations, digital imaging and measurements of ascomata, asci and ascospores were made on material mounted in distilled water, 5% KOH and phloxine with either an Olympus CX31 microscope and Olympus SP-350 digital camera or a Zeiss Axioskop microscope and a Dage MTI video camera. Material mounted in calcofluor (Romero and Minter 1988) was examined by epifluorescence (EF) microscopy with a Zeiss Axioplan to observe ascospores

and apical rings in the asci. Drawings were made with a camera lucida.

Attempts were made to culture these species. Ascospores were removed from ascomata with a sterile needle and transferred to Petri plates containing potato dextrose agar (PDA) (Hawksworth et al. 1995). They were incubated under laboratory conditions with approximately 12 h fluorescent light per day at 25 C. No cultures were obtained due to lack of ascospore germination.

RESULTS AND DISCUSSION

Cercophora argentina Catania, A.I. Romero, Huhndorf & A.N. Mill., sp. nov. FIGS. 1–20

Ascomata perithecialia ovalia, 750–900 × 450–500 μm, superficialia; collum cylindricum vel conicum, leviter curvatum, nigrum, glabrum. Peridium membranaceum, brunneum, tristratosum, cellulis cum poris Munki. Asci 8-spore, annulo apicali haud profundo, simplici; globulus subapicalis absens. Ascosporeae in statu hyalino unicellulares, cylindratae, (58.5–)61–73 × (–)5–6.5 μm, leviter sigmoideales vel geniculatae cum appendicibus bipolaribus dein uniseptatae; cellula superior brunnea, clavata vel ellipsoidea, 18–22 × 9.0–12 μm; pedicellus 0–3(–4) septatus, hyalinus ad brunneum, 35–50 × 4.5–5 μm. Lignicola.

MycoBank MB519727

Etymology: Refers to the type country.

Ascomata perithecial ovoid, 750–900 × 450–500 μm, numerous, in small groups or densely crowded, superficial; neck cylindrical to conical, slightly bent, dark brown to black, glabrous; subiculum sparse at the base, composed of branched, pale to dark brown hyphae, 3–5 μm diam, thick-walled, septate. Ascomatal wall of textura angularis in surface view, cells thick-walled, pale to dark brown, 9–16 μm diam, cells with numerous Munk pores; in longitudinal section three-layered, 90–200 μm wide; outer layer 11–13 μm thick, composed of thick-walled, irregular, brown cells, 5–9 μm diam; middle layer 72–90 μm thick, composed of thin-walled, isodiametric to rectangular, hyaline to pale brown cells, 12–14(–27) μm diam; inner layer 13–17 μm thick, composed of elongate, thin-walled, brown cells, 13–26(–35) × 4–5 μm. Asci cylindrical, part sporifera 150–240 × 12–18 μm, long-stipitate, stipe 45–78(–96) μm long, unitunicate, ring narrow, shallow, refractive; subapical globule absent; with eight biseriate ascospores. Paraphyses hyaline, numerous, septate, 2–3 μm diam. Ascospores cylindrical, ends rounded, (58.5–)61–73 × (–)5–6.5 μm, slightly sigmoid or geniculate, hyaline, aseptate, with granulate content; with bipolar appendages, up to 55 μm long, hyaline, appendages generally collapse and disappear with age; ascospore becoming differentiated into a swollen head and pedicel, transversely uniseptate; head clavate to elliptical, aseptate or with a transverse

septum in the middle or slightly below the middle, 18–22 × 9.0–12 μm, truncate at the base, hyaline, becoming pale yellow to dark brown; pedicel 35–50 × 4.5–5 μm, 0–3(4–) septate, hyaline to pale brown, with granulate content and numerous oil drops.

Anamorph: unknown.

Habitat: on fallen branch of *Sambucus nigra* ssp. *peruviana* (Kunth) Bolli. This species belongs to the family *Caprifoliaceae* and is a native shrub or tree in Argentina occurring at 1500–2000 s.l.m, in several provinces including northwestern Catamarca, Jujuy, southwestern Neuquén and Tucumán (Zuloaga and Morrone 1999).

Geographic distribution: Argentina (Tucumán).

Material examined: ARGENTINA. TUCUMÁN: Dpto. Tafí del Valle, La Heladera, 1300 s.l.m, 27°01'20"S, 65°39'10"W, 20–IV–2006, Hladki 2945, on stem of *Sambucus nigra* L.ssp. *peruviana* (HOLOTYPE LIL; ISOTYPE ILLS 60485).

Cercophora argentina occurs on wood and possesses a non-areolate peridium with Munk pores and ascospores, 61–73 × 5–6.5 μm. *Cercophora appalachiana* O. Hilber & R. Hilber and *C. californica* are two other species of *Cercophora* that are reported to have Munk pores in the peridial cells. However both are different from *C. argentina*. *Cercophora appalachiana* possesses ascomata covered by long hairs, smaller ascospores, 37–48(–68) × 3.5–4.5 μm, and shorter ascospore appendages (Hilber et al. 1987), while *C. californica*, on dung, possesses an areolate ascomatal wall and longer ascospores (75.5–95 μm), although the original description incorrectly describes the ascospores as being 30–35 μm long (Plowright 1878). Molecular studies have shown that many genera in the Sordariales, including *Cercophora*, are polyphyletic (Miller and Huhndorf 2005). This new species is proposed within the genus based on morphological characters.

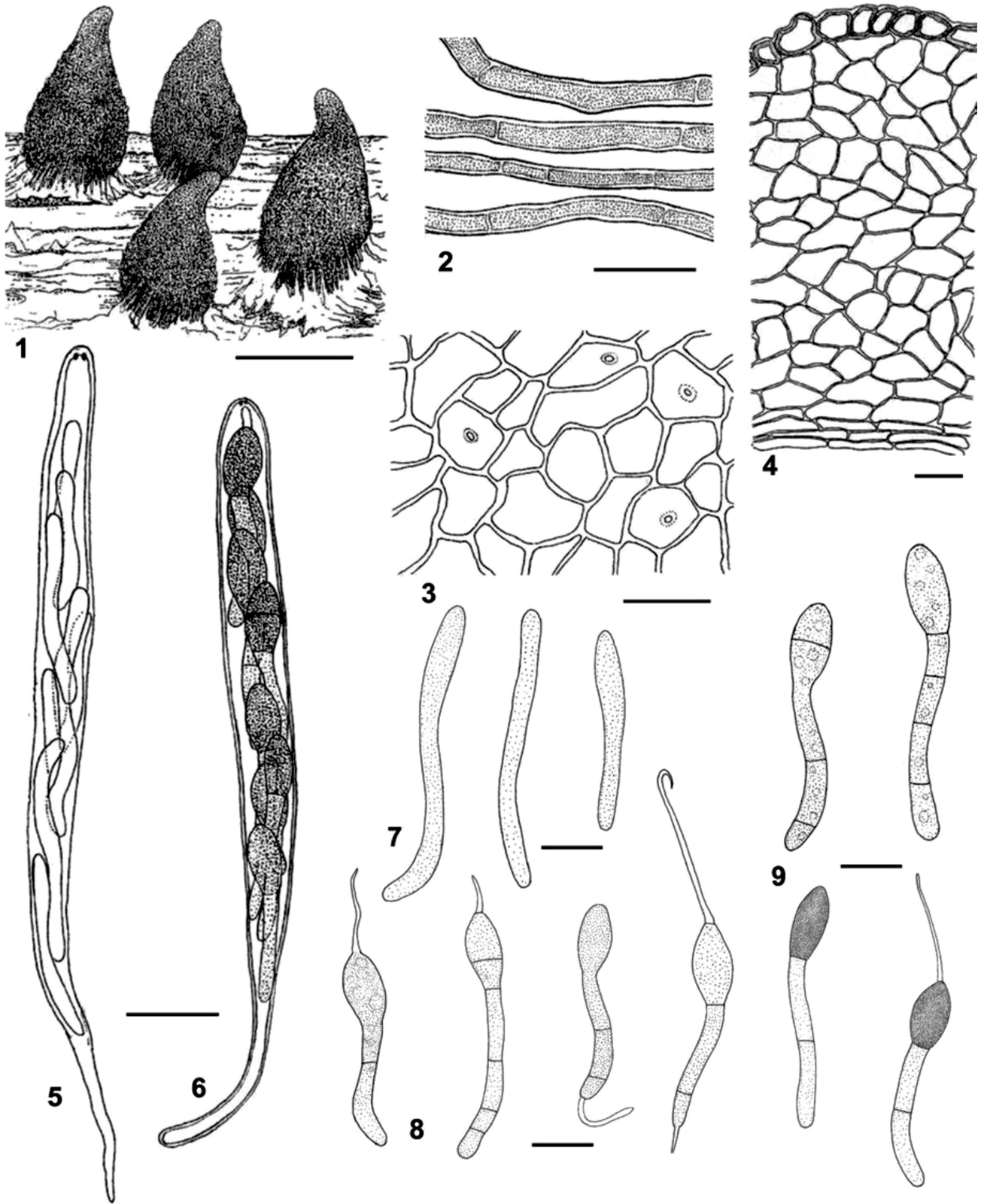
Cercophora californica (Plowr.) N. Lundq., Symb. Bot. Upsal. 20:106, 1972.

= *Sordaria californica* Plowr., Grevillea 7:72, 1878.

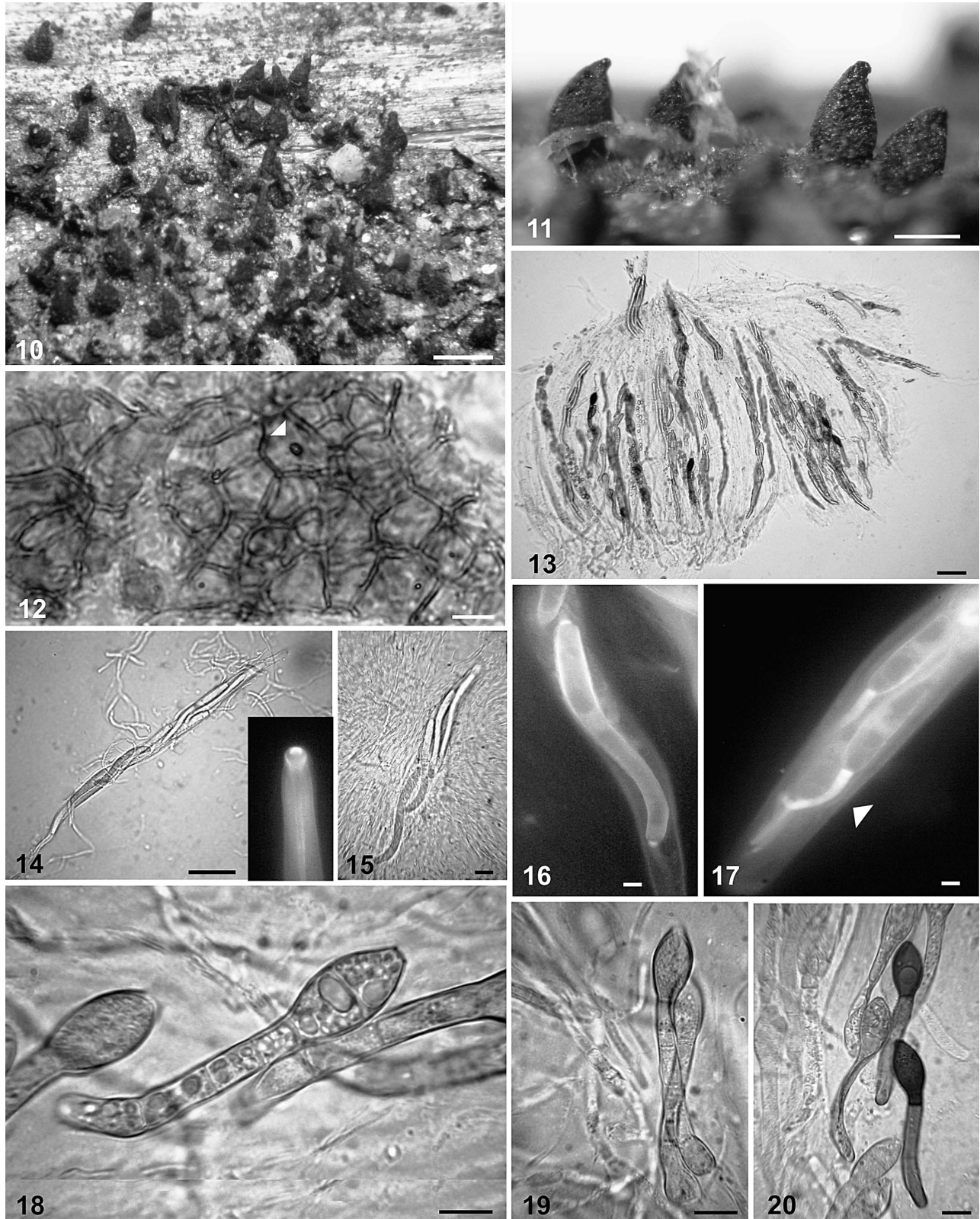
= *Cercophora coprogena* (Speg.) N. Lundq., Symb. bot. upsal. 20:105, 1972.

= *Podospora coprogena* Speg., Bol. Acad. Nac. Ci. (Córdoba) 25:50, 1921. FIGS. 21–40

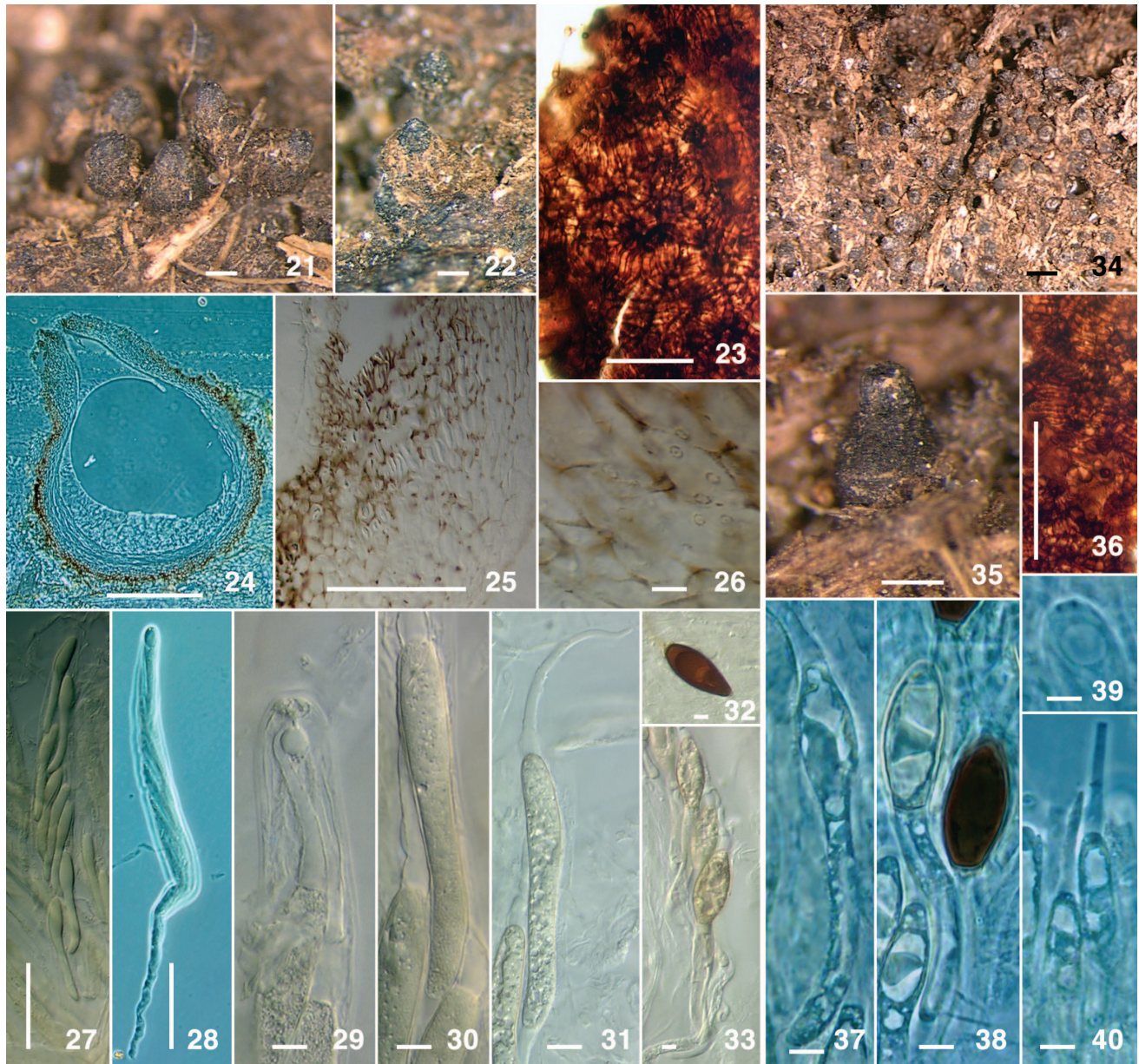
Ascomata ovoid to obpyriform, dark brown, firm consistency (cartilaginous), papillate, 600–900 μm diam, 850–1000 μm tall, numerous, clustered in large groups, immersed becoming erumpent; surface roughened; neck conical, deeply 7–8-sulcate, distinct; subiculum absent. Ascomatal wall weakly areolate in surface view; 60–70 μm thick in longitudinal section, two-layered, composed of thick-walled scleroplectenchymatous to pseudoparenchymatous cells, with an inner, hyaline layer with numerous Munk pores and an outer, unevenly brown pigmented layer. Ascomatal apex without apparent periphyses. Paraphyses



FIGS. 1-9. *Cercophora argentina* sp. nov. (Holotype LIL Hladki 2945). 1. Ascomata on substrate. 2. Subiculum hairs. 3. Surface view of ascomal wall, cells with Munk pores. 4. Longitudinal section through ascomal wall. 5. Ascus with young ascospores. 6. Ascus with mature ascospores. 7. Young ascospores. 8. Ascospores with appendages. 9. Mature ascospores. Bars: 1 = 0.5 mm, 2-9 = 10 μ m.



FIGS. 10–20. *Cercophora argentina* sp. nov. (Holotype LIL Hladki 2945). 10–11. Ascomata on substrate. 12. Surface view of ascomal wall, cells with Munk pores. 13. Asci and paraphyses. 14. Ascus, plus detail of apex with EF (inset). 15. Ascus. 16–17. Ascospore with appendage (arrow) (EF). 18–19. Ascospores in different stages of development. 20. Mature ascospore. Bars: 10 = 1 mm; 11 = 0.5 mm; 12, 16–17 = 5 μ m; 13–14 = 25 μ m; 15, 18–20 = 10 μ m.



FIGS. 21–33. *Cercophora californica* (Holotype KM68745; Isotype NY). 21, 22. Ascomata on substrate. 23. Surface view of ascomal wall. 24. Longitudinal section through ascoma. 25, 26. Longitudinal section through ascomatal wall with Munk pores. 27, 28. Asci. 29. Ascus apex. 30–33. Ascospores. 21, 24, 25. From Holotype; 22, 23, 26–33. From Isotype. 34–40. *Cercophora coprogena* (Holotype LPS 6856). 34, 35. Ascomata on substrate. 36. Surface view of ascomal wall. 37, 38. Ascospores. 39. Ascus apex. 40. Ascospore appendages. Bars: 34 = 1 mm; 21, 22, 24, 35 = 0.5 mm; 23, 25, 27, 28, 36 = 100 μ m; 26, 29–33, 37–40 = 10 μ m.

filiform, 3–4 μ m wide, abundant, septate, unbranched, persistent. Asci cylindrical, spore-bearing part 250–350 \times 20–30 μ m, numerous, unitunicate, thin-walled, apex blunt; ring narrow, shallow; subapical globule present; with eight biseriolate ascospores. Ascospores cylindrical, ends rounded, slightly sigmoid, hyaline, aseptate; becoming differentiated into a swollen head and pedicel and transversely uniseptate; 70–90(–95) \times 6–10 μ m, head ellipsoid, 30–35 \times 14–16 μ m, conical at the apex, truncate at the base, hyaline to dark

brown; bipolar appendages present, 20–40(–80) μ m, gelatinous, lash-like.

Material examined: CHILE. Los Perales, 1918, on cow dung, C. Spegazzini 6856 (HOLOTYPE of *P. coprogena*, LPS). USA. CALIFORNIA, on cow dung, H.W. Harkness 513 (K(M): 68745, HOLOTYPE of *S. californica*, K; ISOTYPE, NY).

Cercophora californica appears to be the same as *C. coprogena*, which is a younger name and therefore a

synonym. Both species occur on cow dung with *C. californica* known only from the type collection from California, USA, and *C. coprogena* known only from the type collection from Chile. In both species the ascomata are large and obpyriform with a distinctly sulcate neck (FIGS. 21, 35). The neck appears erumpent through a crusty surface on the dung with the entire ascomata eventually becoming erumpent (FIGS. 22, 34). In both species the ascomatal wall in surface view is weakly areolate (FIGS. 23, 36). The cells are arranged in a circular pattern around a central darkened area but are not sufficiently distinct to crack into plates along the lines of the thin-walled hyaline cells. Also present is an uneven brown pigmentation in the outer wall cells of both species. Areolate peridia are seen in a number of *Cercophora* species that do not appear to be closely related based on analyses of DNA sequence data. The most distinct areolate pattern is seen in *Cercophora areolata* N. Lundq. where the walls are more strongly carbonized and distinct plates are formed that crack along the lines of weakness of the hyaline cells. Less carbonized but still distinct areoles are seen in *C. solaris* (Cooke & Ellis) R. Hilber & O. Hilber and *C. striata* (Ellis & Everh.) N. Lundq. The indistinct or weak areolate type of walls seen in *C. californica* also is seen in *C. coprophila* (Fr.) N. Lundq. Areolate walls are not unique to the Sordariales; they also are found in widely distant taxa, such as *Cephalotheca* Fuckel (Cephalothecaceae) and *Bertiella macrospora* (Sacc.) Sacc. & Traverso (Melanommataceae). The inner layer of the ascomal wall in *C. californica* has numerous Munk pores (FIG. 26) as seen in the new species, *C. argentina*, and as illustrated in *C. appalachianensis*. Munk pores are predominant in species in the Coronophorales (Nannfeldt 1975) but occasionally are seen in species outside this group (Huhndorf et al. 2004). They do not appear to be phylogenetically significant at taxonomic rank beyond species. The wall of *C. californica* also is composed of thick-walled cells (FIG. 25), similar to those seen in *C. albicollis* N. Lundq. The wall of *C. albicollis* has been interpreted as pseudo-bombardioid (Miller 2003) putatively similar to the walls found in *C. costaricensis*, *C. elephantina* (Henn.) N. Lundq. and *C. scortea* (Cain) N. Lundq., but these walls are not all the same. *Cercophora albicollis* and *C. californica* lack the gelatinized layer with ramifying hyphae found in the others. Only thick-walled cells are present and these are predominant in the neck region (FIG. 25). These two species probably represent another group of taxa with a distinct wall type, *C. californica*, differing with a weak areolate surface pattern not seen in *C. albicollis*.

Cercophora costaricensis (G.C. Carroll & Munk) O. Hilber & R. Hilber, Z. Mykol. 45:217, 1979.

≡ *Bombardia costaricensis* G.C. Carroll & Munk, Mycologia 56:80, 1964. FIGS. 41–48, 70–76

Ascomata perithecial ovoid, papillate, (350–)400–500 µm high, 300–400 µm diam, numerous, gregarious, occasionally separated, superficial; surface rugose or granulate; neck conical, black, glabrous; subiculum sparse at the base, composed of brown hyphae, 3–4.5 µm diam, thick-walled, septate. Ascomatal wall of *textura angularis* in surface view, cells thick-walled, radially arranged around a darker center; in longitudinal section three-layered, 90–123.5 µm wide; outer layer 10–19(–25) µm thick, composed of thick-walled, dark brown cells, 5–8 µm diam; middle layer 52–81(–84.5) µm thick, composed of thick-walled, gelatinized, hyphae, lumen ca. 1.5–2 µm; inner layer 13–15(–17) µm thick, composed of elongate, hyaline to pale brown cells, 9–15 × 1–2 µm. Asci cylindrical, 135–186 × 13–16 µm, long-stipitate, stipe 30–66 µm long, numerous, unitunicate, thin-walled, apex truncate; ring narrow, shallow, refractive; subapical globule absent; with eight biseriate ascospores. Paraphyses not seen. Ascospores cylindrical, ends rounded, 40–49 × 4–5 µm, slightly sigmoid or geniculate, hyaline, aseptate, plasmatic content granulate; with bipolar appendages, up to 20 µm long, becoming differentiated into a swollen head and pedicel, transversely uniseptate; head elliptical, ovoid, aseptate, 18–22 × 8–9(–10) µm, subacute to rounded at the apex, truncate at the base, hyaline to dark brown, with one or two oil drops; pedicel 22–27 × 4–5 µm, hyaline; appendages disappear with age.

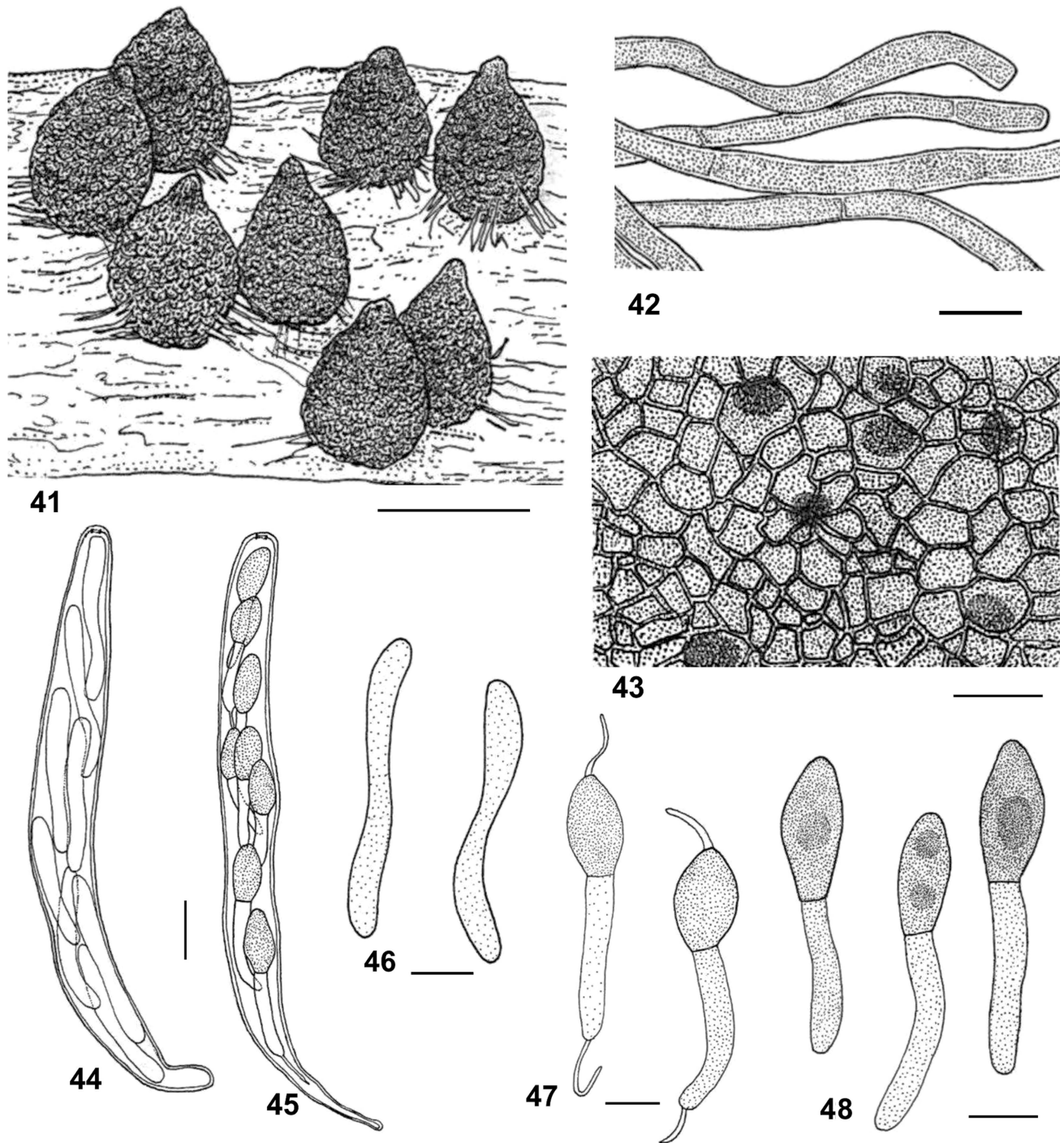
Anamorph: unknown.

Habitat: on wood of fallen branch.

Geographic distribution: Argentina (Tucumán), Costa Rica (Hilber and Hilber 1979), Venezuela (Portuguesa).

Material examined: ARGENTINA: TUCUMÁN: Depto. Tafí Viejo, Parque Biológico Sierra de San Javier, Cumbres de Taficillo, Las Mentas, in forests of *Podocarpus parlatorei*, 1600 s.l.m., 26°42'820"S, 65°19'530"O, 24-V-1999, Catania 1669 (LIL, ILLS 60486). VENEZUELA: PORTUGUESA: road between La Estacion and Santa Rosa del Guache, approx 3 mi S Santa Rosa, 16-I-1993, S.M. Huhndorf, et al., 368 (F).

Our material agrees with the description by Hilber and Hilber (1979), except for the smaller size of the ascospore appendages (material studied by Hilber and Hilber were 35 µm long, while material by Carroll and Munk [1964] were up to 100–200 µm long). However, as pointed out by Lundqvist (1972), measurements of these structures can vary greatly, depending on the amount of pressure placed on the cover slip at the time of slide preparation. The most striking feature of this species is the ascomal peridium, which was termed pseudo-bombardioid by Lundqvist (1972) and Miller (2003) because the ascomal wall is non-stromatic. The pseudo-bombardioid wall has been described in nine species in three genera of *Lasiosphaeriaceae*, *Arnium ontariense* (Cain)



FIGS. 41–48. *Cercophora costaricensis* (LIL Catania 1669). 41. Ascomata on substrate. 42. Subiculum hairs. 43. Surface view of ascomal wall. 44. Ascus with young ascospores. 45. Ascus with mature ascospores. 46. Young ascospores. 47. Ascospores with appendages. 48. Mature ascospores. Bars: 41 = 0.5 mm; 42–48 = 10 μ m.

J.C. Krug & Cain; *Cercophora albicollis*, *C. costaricensis*, *C. elephantina*, *C. palmicola* Hanlin & Tortolero, *C. scortea*, *Podospora appendiculata* (Auersw. ex Niessl) Niessl, *P. fimiseda* (Ces. & de Not.) Niessl, and *P. perplexans* (Cain) Cain (Carroll and Munk 1964, Furuya and Udagawa 1972, Lundqvist 1972, Hilber

and Hilber 1979, Hanlin and Tortolero 1987, Bell and Mahoney 1997).

The morphology of the pseudo-bombardioid wall is slightly homoplasious in the Sordariales and it appears to have arisen independently in two distantly related groups, although relationships among these

groups were unsupported at that time according to Miller and Huhndorf (2005). They also pointed out that “while ascospore morphology cannot be used for delimiting genera, ascomal wall morphology alone or in combination with other characters is still useful at some level for distinguishing taxa”.

Cercophora natalitia (Speg.) N. Lundq., Symb. Bot. Upsal. 20:94, 1972.

≡ *Hypocopra natalitia* Speg., An. Soc. Cient. Argent. 10:14, 1880. FIGS. 49–60

Ascomata obpyriform, dark brown, erumpent with only the papillate ostioles visible, scattered, membranaceous, 250–300 µm diam, 310–350 µm high, numerous, covered with flexuous, branched, septate, golden brown, 2–2.5 µm thick hairs; neck short, stout, darker brown than the rest of the peridium. Ascromatal wall of *textura angularis* in surface view; in longitudinal section two-layered, 20–40 µm thick, composed of pseudoparenchymatous cells, 3–5 × 7–10 µm. Paraphyses filiform, abundant, septate, unbranched, persistent. Asci cylindrical, not possible to measure, numerous, unitunicate, thin-walled, apex blunt; ring not seen, subapical globule present; with eight biserial ascospores. Ascospores becoming differentiated into a swollen head and pedicel, head 15–19 × 8–10 µm, conical at the apex, truncate at the base, pedicel hyaline, 4–6 × 30–40 µm, with a single appendage observed, although possibly bipolar, gelatinous, lash-like.

Material examined: ARGENTINA. BUENOS AIRES (FEDERAL CAPITAL), Recoleta, 20–IV–1880, on trunk of *Pircunia dioica* (L.) Moq. (= *Phytolacca dioica* L.), C. Spegazzini (HOLOTYPE LPS 6841).

Lundqvist (1972) said “*Cercophora natalitia* is very close to the lignicolous *Cercophora caudata* (Curr.) N. Lundq., which differs by its short caudae and more pronounced swollen cells and hairs on the neck” (according to annotation label when Lundqvist examined Spegazzini’s collection). He also pointed out (1972: 94) “this species differs mainly by up to 55 µm long gelatinous caudae and a simple, narrower (3 µm) apical ring”. *Cercophora aquatica* P. Chaudhary, J. Fourn. & A.N. Mill. (Chaudhary et al. 2007) is similar to *C. natalitia* in that both share aquatic habitats, but the former can be distinguished by its areolate ascromatal wall, lack of a subapical globule and double ascus apical ring. *Cercophora natalitia* is distinguished from *C. argentina* by its mostly immersed ascromata with ascromatal hairs and a short, stout neck, and the presence of a subapical globule.

The habitat in the locality where Spegazzini found *C. natalitia* does not exist anymore. Today the locality is a tourist neighborhood in the middle of Buenos Aires. To look for this species today, one might search along the marginal forest on the Río de La Plata north or south of the city.

Cercophora solaris (Cooke & Ellis) R. Hilber & O. Hilber, Z. Mykol. 45:221, 1979.

≡ *Sphaeria solaris* Cooke & Ellis, Grevillea 5:1876.

≡ *Lasiosphaeria solaris* (Cooke & Ellis) Sacc., Syll. Fung. 2:2002, 1883.

≡ *Thaxteria solaris* (Cooke & Ellis) Höhn, Ann. Mycol. 16:75, 1918. FIGS. 61–69, 77–85

Ascomata globose to subglobose, papillate, (300–)400–500 µm high, 300–450 µm diam, numerous, gregarious, superficial; surface rugose, short; neck sulcate or glabrous, black; subiculum sparse at the base, composed of branched, brown hyphae, 3–4.5 µm diam. Ascromatal wall areolate in surface view, irregular, carbonaceous, composed of dark brown to black, erect thin-walled, rectangular cells radially arranged around dark brown cells, up to 21 µm diam; in longitudinal section three-layered, 30–80 µm wide; outer layer 4–12.5 µm thick, composed of brown cells; middle layer 14–22 µm thick, composed of irregular, dark brown to black cells; inner layer 6.5–18.5 µm thick, composed of elongate, thin-walled slightly colored cells. Asci cylindrical, 110–127.5 × (–9)10–12 µm, unitunicate, thin-walled, apex truncate; ring narrow, shallow, refractive; subapical globule absent; with 8 biserial ascospores. Paraphyses hyaline, numerous, septate, branched. Ascospores cylindrical, ends rounded, 19–25 × 4–4.5 µm, slightly sigmoid or geniculate, hyaline, aseptate, sometime with 1–2-septate, without bipolar appendages, germination by germ tubes; becoming differentiated into a swollen head and pedicel, transversely uniseptate; head elliptical, truncate at the base, aseptate, 10–12(–13) × 5–6.5 µm, dark brown; pedicel 8–10(–12) × 3–4 µm, hyaline, collapsing.

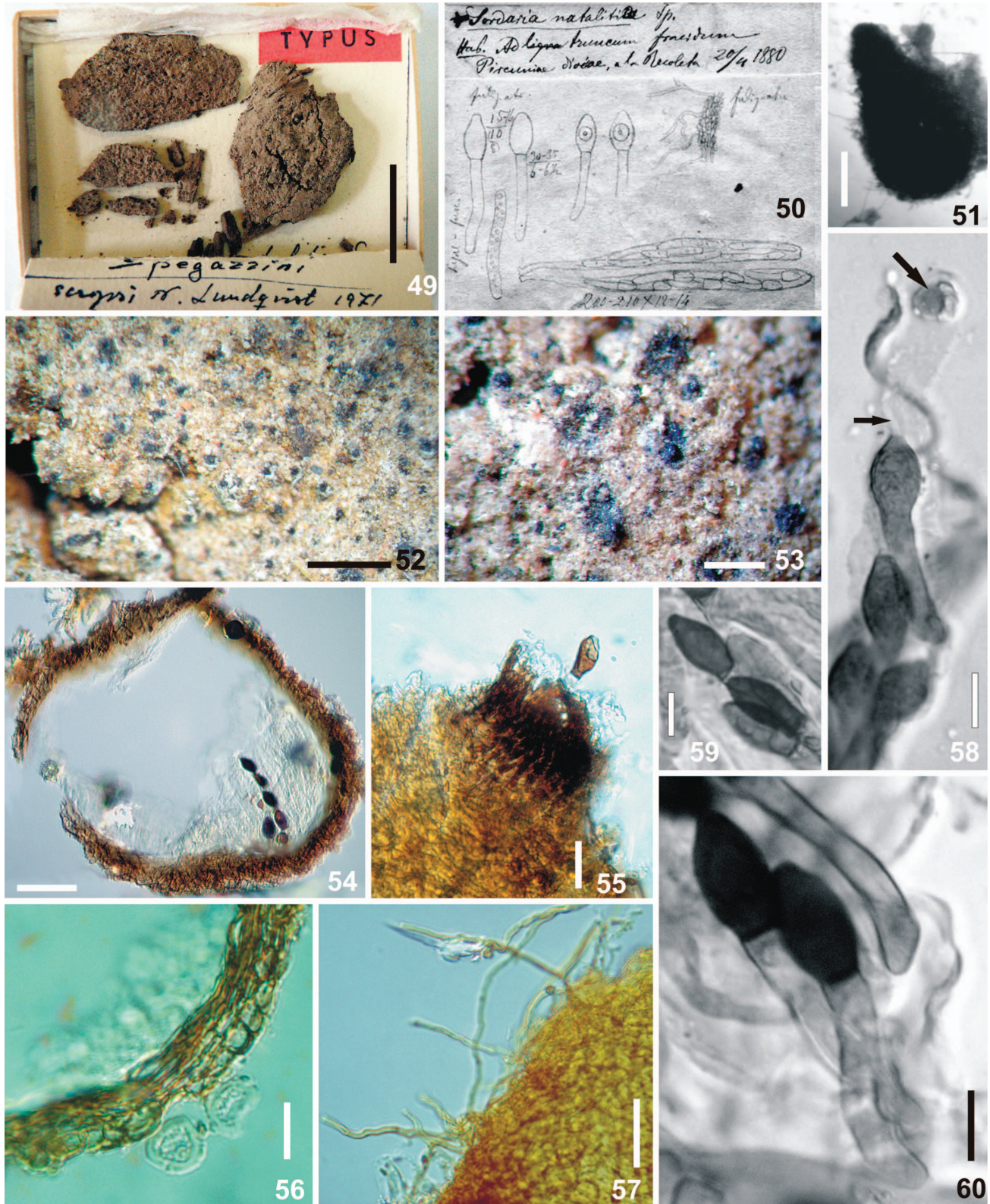
Anamorph: *Mammaria echinobotryoides* Cesati, and a phialophora-like synanamorph, were obtained in culture by Samuels (pers comm in Barr 1990), from ascospores of *Cercophora solaris*.

Habitat: on bark and wood of fallen branch.

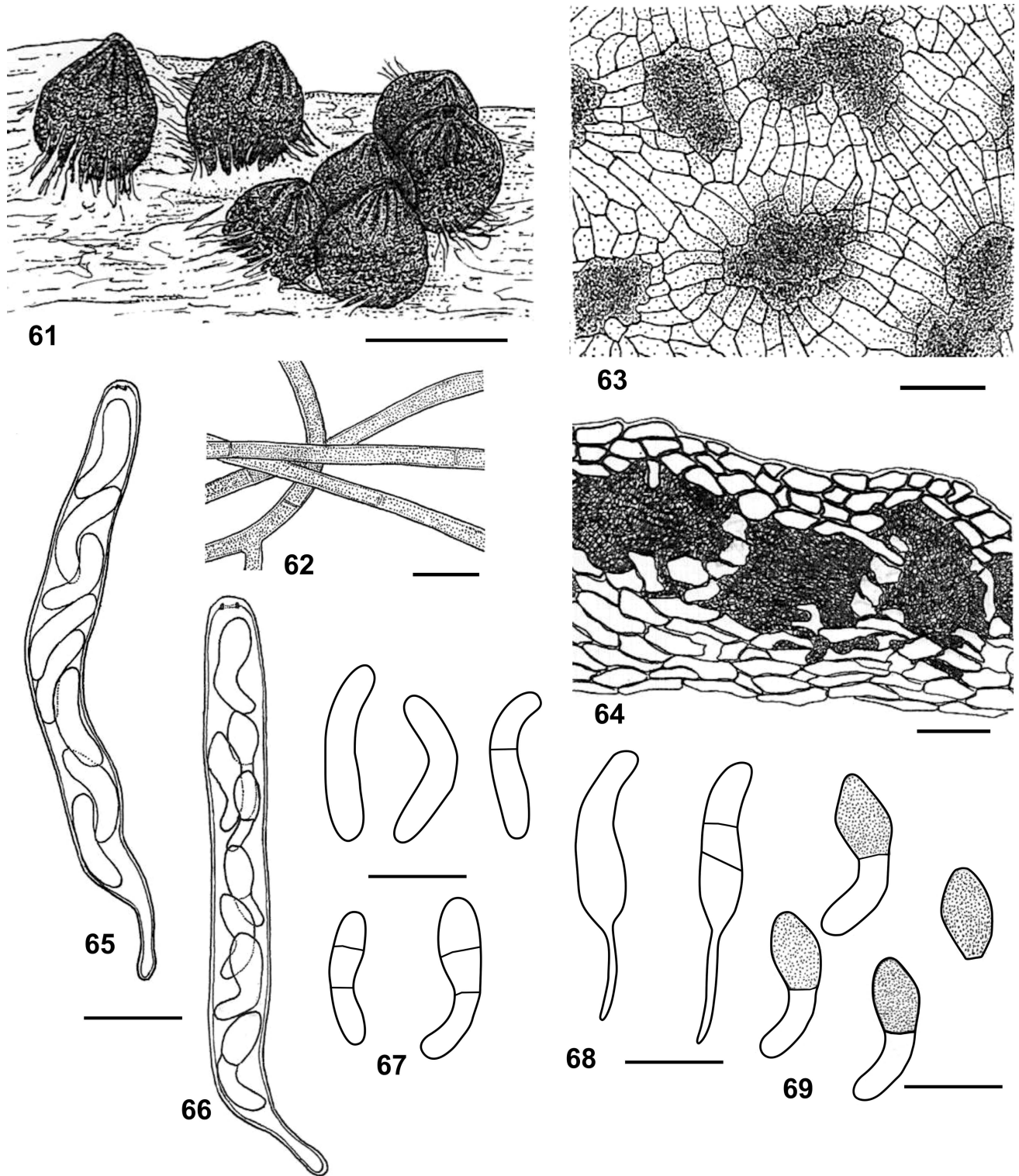
Material examined: ARGENTINA. TUCUMÁN: Depto. Tafti Viejo, Parque Biológico Sierra de San Javier, Cumbres de Taficillo, Las Mentas, in forests of *Podocarpus parlatorei*, 1600 s.l.m.; 26°42′820″S, 65°19′530″W, I–III–1999, Catania 1326 (LIL); *ibid.*, 24–V–1999, Catania 1664 (LIL, ILLS 60487).

Geographic distribution: Argentina (Tucumán); Germany, USA (Hilber and Hilber 1979); New Zealand (Pennycook and Galloway 2004) and Taiwan (Hsieh et al. 2000).

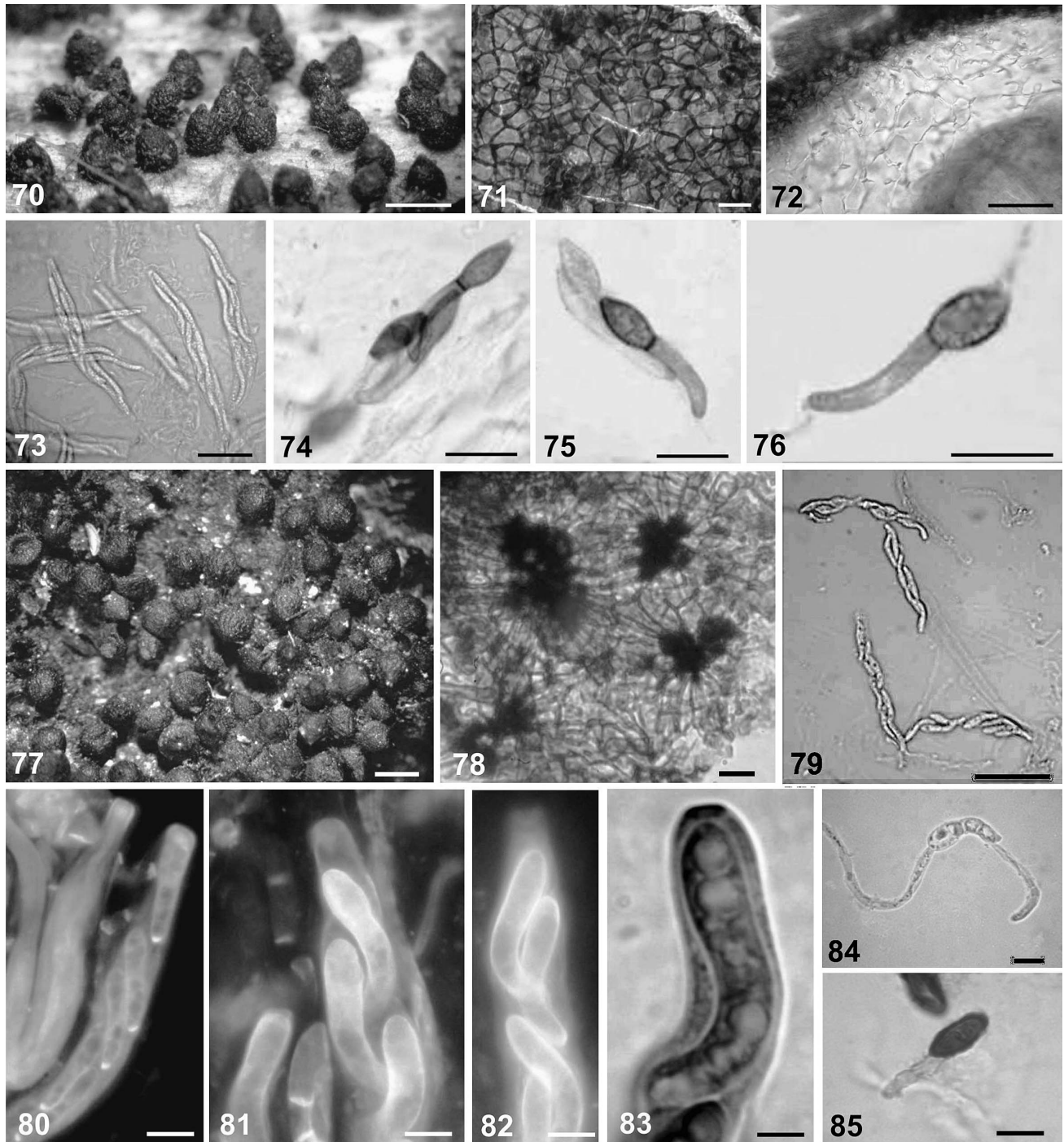
Our material agrees with the description by Hilber and Hilber (1979). This species possesses a weakly areolate wall, as in *C. californica*, but is easily distinguished by its short, comma-shaped ascospores. Only one other species of *Cercophora*, *C. spinosa* (Harkn.) M.E. Barr, possesses similarly shaped ascospores, but this species can be separated by its thick-walled setae on the ascromata and its shorter ascospores (11–12 vs. 19–25 µm) (Barr 1993). Although not commonly collected, *C. solaris* appears to have a wide geographical distribution because ITS



FIGS. 49–60. *Cercophora natalitia* (Holotype LPS 6841). 49. Macroscopic view of the type. 50. Spiegazzini's drawing on the front of the envelope. 51. Ascus. 52–53. Ascomata immersed in the substratum and covered by sediments. 54, 56. Longitudinal section of an ascus. 55. Ostiole surrounded by darker cells, with ascospore being released. 57. Surface view of the peridium with hairs. 58. Young ascus; note the subapical globule (arrow) and a gelatinous cauda (arrow). 59, 60. Ascospores. Bars: 49 = 1.5 cm; 51 = 150 μ m; 52 = 1 mm; 53 = 0.2 mm; 54 = 50 μ m; 55, 56 = 20 μ m; 57 = 25 μ m; 58–60 = 10 μ m.



FIGS. 61–69. *Cercophora solaris* (LIL Catania 1326). 61. Ascomata on substrate. 62. Subiculum hairs. 63. Surface view of ascomal wall. 64. Longitudinal section through ascomal wall. 65. Ascus with young ascospores. 66. Ascus with mature ascospores. 67. Young ascospores. 68. Ascospores with germ tube. 69. Mature ascospores. Bars: 61 = 0.5 mm, 62–69 = 10 μ m.



FIGS. 70–76. *Cercophora costaricensis* (LIL Catania 1669). 70. Ascomata on substrate. 71. Surface view of ascomatal wall. 72. Cross section through ascomatal wall. 73. Asci. 74, 75. Ascospores. 76. Mature ascospore with appendages. 77–85. *Cercophora solaris* (LIL Catania 1326). 77. Ascomata on substrate. 78. Surface view of outer areolate ascomatal wall. 79. Asci. 80–82. Asci and ascospores (EF). 83. Ascus, detail of apex. 84. Ascospores with germ tube. 85. Mature ascospore. Bars: 70, 77 = 0.5 mm; 71 = 15 μ m; 72–73 = 50 μ m; 74–76 = 20 μ m; 78, 79, 80–82, 84, 85 = 10 μ m; 83 = 5 μ m.

and LSU sequences generated from specimens from New Zealand and USA differ by only a few base pairs (Miller pers data). Multiple attempts to sequence Argentinian material (Catania 1664) of *C. solaris*

failed (Miller pers comm). Previous hosts given for this species were angiosperms (*Acer* sp. and *Populus* sp.), thus this is the first time *C. solaris* is reported on a gymnosperm.

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