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Phillipsiella crescentiae comb. nov. and a redescription of *P. atra*, type of the genus *Phillipsiella*

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The type and only species described in *Bactridiopsis* was found to be a loculoascomycete rather than a deuteromycete. Structures described as large, one to three-septate conidia were determined to be immature pseudoparaphyses among which bitunicate asci develop in an exposed hymenium held together by gelatinous material. Although developing from a pseudoparenchymatous basal stroma, the hymenium is not enclosed in any kind of cellular structure, thus the ascomata resemble apothecia. This discomycetous loculoascomycete occurs superficially on scale-like glandular hairs on living leaves of *Crescentia cujete*, calabash. *Bactridiopsis crescentiae* is transferred to the genus *Phillipsiella* as *P. crescentiae*. Based on three isotype specimens, the type species of *Phillipsiella*, *P. atra*, is redescribed and illustrated.

Keywords: calabash, *Crescentia*, Deuteromycetes, fly-speck, Loculoascomycetes.

Bactridiopsis P. Hennings (1904) is a genus of tubercularіaceous fungi the type of which was reexamined and a modern description published by Mouchacca (1983). In the course of that study Mouchacca encountered the later homonyn *Bactridiopsis* Fragoso & Ciferri in Ciferri & Fragoso (1927). The type and only species, *Bactridiopsis crescentiae* Fragoso & Ciferri, was described as having large, one to three-septate conidia (Fig. 5) that are, in reality, immature pseudoparaphyses among which bitunicate asci develop in an exposed hymenium. The pseudoparaphyses and bitunicate asci are held together by gelatinous material. Although developing from a pseudoparenchymatous basal stroma, the hymenium is not enclosed in any kind of cellular structure, thus the ascomata resemble apothecia. This discomycetous loculoascomycete occurs superficially on scale-like glandular hairs of calabash, *Crescentia cujete* L.

Discomycetous loculoascomycetes are distributed among a number of families and orders, namely Arthoniales (Barr, 1987); Myriangiales (von Arx, 1963; von Arx & Müller, 1975); Dothideales

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sensu stricto (Barr, 1987); Dothideales *sensu lato*, Phillipsiellaceae (= Saccardiaceae) and Schizothyriaceae (von Arx & Müller, 1975; Eriksson, 1981); Patellariales, Patellariaceae (Eriksson & Hawksworth, 1990) or of uncertain disposition (Rossman, 1987). Within this group of fungi *B. crescentiae* seems best placed in the genus *Phillipsiella* Cooke.

According to Article 68 of the International Code of Botanical Nomenclature 1988 (Greuter & al., 1988), a specific name described in accordance with the Code but originally combined with an illegitimate generic name must be taken into consideration for purposes of priority. Thus, *Bactridiopsis crescentiae* serves as the basionym for this species and the name is herein placed in the genus *Phillipsiella*.

Materials and methods

Herbarium specimens were rehydrated in water and microscopic features were measured in water mounts. Fresh IKI or Melzer's reagent was placed under the cover slip for possible amyloid reaction. Bright-field, phase contrast, epifluorescence, and scanning electron microscopy were used. The optical brightener Calcofluor (0.05% w/v in sodium phosphate buffer at pH 8.0; Sigma Chemical Co.) using a Zeiss Axioplan photomicroscope with planachromatic neofluor lenses and Zeiss "05" filter was used for fluorescence microscopy.

Taxonomy

Phillipsiella crescentiae (Frag. & Ciferri) A. Y. Rossman & J. Mouchacca, comb. nov. – Figs. 1–7.

≡ *Bactridiopsis crescentiae* Frag. & Ciferri, Bol. Real Soc. Esp. Hist. Nat. 27: 330. 1927.

Ascomata scattered on the adaxial surface of living leaves, each covering peltate, glandular hairs, superficial, without hyphae penetrating the cells of the hairs. When dried, appearing shiny, black, flattened hemispheric, thin at the margins, easily detached from the leaf. Upon rehydration becoming pulvinate, reddish to dark brown, 125–250 µm wide × 70–90 µm high. Ascomata held together by a gelatinous matrix in which the pseudoparaphyses, asci and ascospores are embedded; excipulum lacking. – Gelatinous material apparently secreted from glandular leaf hairs into the fungus. – Pseudoparaphyses and asci developing from pseudoparenchymatous basal stroma, stroma 15–25 µm thick, of cells 3–5 µm diam with slightly thickened, dark brown walls (Fig. 5). Pseudoparaphyses 2–3 µm wide, septate, hyaline, developing from basal stroma prior to formation of asci, unbranched between asci, at maturity,

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pseudoparaphyses branching above the asci, becoming inflated and pigmented at the apices to form a pseudoepithecium (Figs. 6, 7). – Asci bitunicate, subglobose to globose with narrow stipe, 25–35 × 15–28 µm, with thickened walls 2–3 µm at maturity, up to 6 µm thick at apex in immature asci, Melzer's negative, dehiscence not observed. – Ascospores ovoid to ellipsoid, 13–16 × 3–5 µm, with the upper cell slightly broader than the lower one, one-septate, rarely two-septate, hyaline, smooth.

Material examined. – DOMINICAN REPUBLIC. Provincia de La Vega: Bonao, Moca, on the upper surface of dried, living leaves of *Crescentia cujete* L. (Bignoniaceae), 12 Feb. 1927, coll. Dr. R. Ciferri, type of *Bactridiopsis crescentiae* Fragoso & Ciferri (NY-two packets with same collection data, packet on right side of sheet herein designated LECTOTYPE).

Members of the genus *Phillipsiella* are characterized by discoid ascomata, bitunicate asci, branching pseudoparaphyses, and occurrence on living leaves. The pseudoparaphyses are often well developed forming a distinct excipulum and epithecium as in the type species, *P. atra* Cooke (von Arx & Müller, 1975). Confusion exists concerning the characteristics of the interthecial elements in *Phillipsiella*, thus three isotype specimens of *P. atra* were examined.

Phillipsiella atra Cooke, Grevillea 7: 48. 1878.

Ascomata irregularly scattered on adaxial surface of leaves, superficial on leaf hairs, solitary, not penetrating cells of hairs. Ascomata apothecial, 175–300 µm wide × 30–45 µm high, black, flattened, with slightly raised margin, upper surface black, granular, hymenium hyaline, fleshy to gelatinous. – Pseudoparaphyses and asci developing from pseudoparenchymatous basal stroma, stroma 7–10 µm thick, of thin-walled, hyaline hyphae. Pseudoparaphyes 1–2 µm wide, septate, hyaline, branching among asci, extending above asci to form a thin, irregular epithecium, 3–8 µm thick, of black, granular, inflated hyphal ends; exciple thin, hyphal, extending from basal tissue and continuous with epithecium. – Asci bitunicate, 23–31 × 7.4–10.5 µm, broadly clavate to short-cylindric, slightly flattened at apex, in immature asci, endotunica extending as a narrow column into the conspicuously domed ascal apex, at maturity ascal apex 2.5–3 µm thick, ascal contents becoming sienna to umber in IKI, no amyloid reaction although Eriksson (1981) observed blueing of the subhymenium, dehiscence not observed. – Ascospores fusiform to ellipsoid, 8.3–10.5 × 2.5–3.7 µm, with rounded ends, one-septate, hyaline, smooth.

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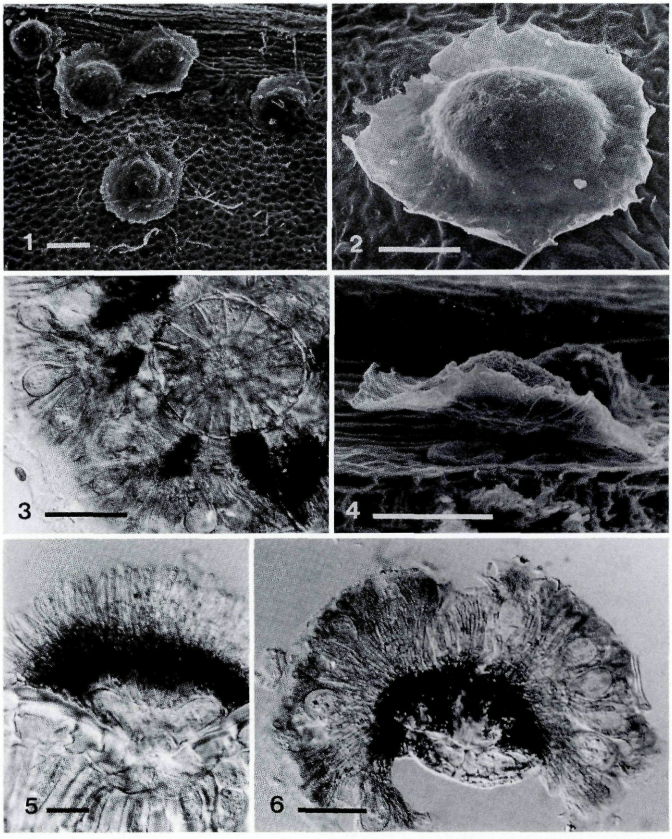

Figs. 1-6. *Phillipsiella crescentiae* (Lectotype). – 1. Ascomata on leaf surface of *Crescentia cujute* L. – 2. Surface view of ascoma showing hemisphaeric shape and narrow margins. – 3. Squash mount of immature ascoma showing cellular structure of peltate hair on living leaf surface. – 4. One ascoma partially separated from leaf surface revealing the peltate, glandular hair over which the fungus develops. – 5. Longitudinal section through immature ascoma borne superficially on peltate hair of *Crescentia cujute*. Developing pseudoparaphyses were apparently mistaken for conidia by the original authors. – 6. Cross-section of young asci among pseudoparaphyses and basal stroma developing over glandular hair. – Scale bar 1, 2, 4 = 100 µm; 3, 5, 6 = 10 µm.

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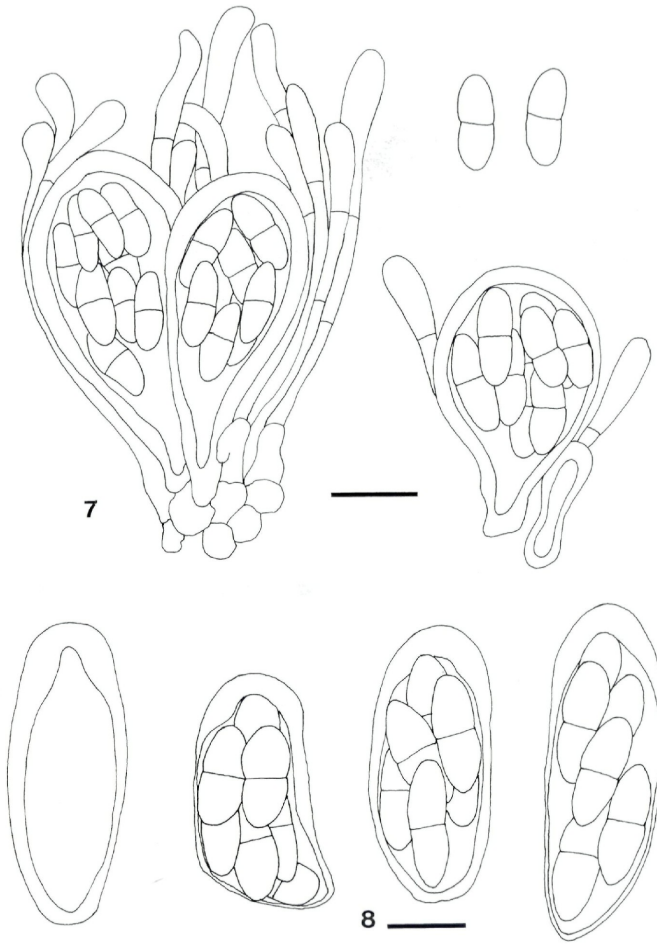

Fig. 7–8. *Phillipsiella crescentiae* (Lectotype), *P. atra* (Ravenel, Fungi Amer. Exs. 327-2 BPI-bound). – 7. Asci among pseudoparaphyses and ascospores of *Phillipsiella crescentiae*. – 8. Asci with immature ascospores of *Phillipsiella atra*. – cale bar = 10 µm.

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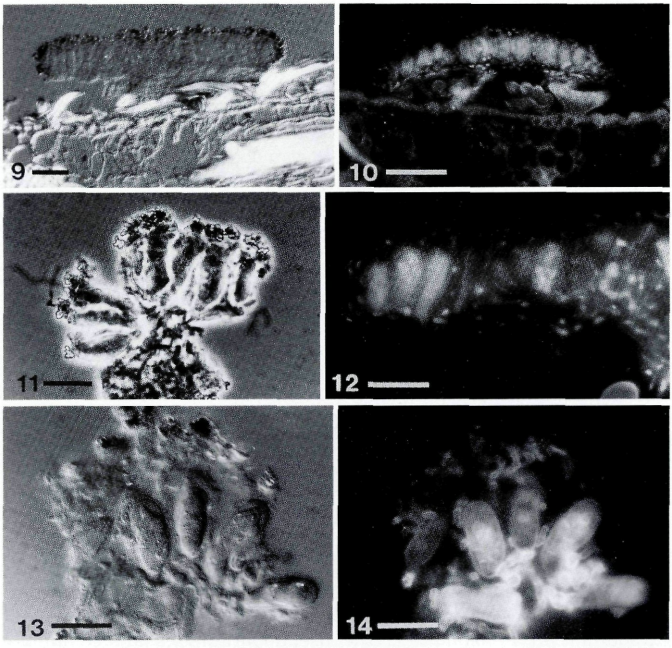

Fig. 9–14. *Phillipsiella atra* (Ravenel, Fungi Amer. Exs. 327-2 BPI-bound). – 9. Cross-section of ascoma. – 10. Cross section of ascoma in fluorescence microscopy. – 11. Asci and interthecial elements forming granular epithecium. – 12. Cross section of ascoma in fluorescence microscopy. – 13. Asci and interthecial elements. – 14. Asci and interthecial elements in fluorescence microscopy. – Scale bar 9–11 = 40 µm; 12–14 = 20 µm.

Material examined. – UNITED STATES. Georgia: Darien, on leaves of *Quercus* [identified as *Q. virginiana*], Ravenel-Fungi Americana Exsiccati no. 327, three specimens of this number, isotypes of *P. atra*, were examined in BPI and numbered 327-2, 327-3, 327-4. A fourth specimen of this exsiccati number (327-1) was determined to be a different fungus than the others as well as occurring on another species of *Quercus*.

The type of the genus *Phillipsiella* is *P. atra* Cooke (1878). The type specimen is cited as Ravenel's American Fungi "On leaves of *Quercus virens*. Darien, Georgia (2501)" and was distributed as H.W. Ravenel–Fungi Americani Exsiccati no. 327 (U.S.A. Georgia, Darien, in foliis *Quercus*). The protologue agrees with the data on this

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exsiccata number and states that the fungus occurs on *Quercus virens* Aiton, now considered a synonym of *Q. virginiana* Mill., southern live oak. Four specimens of this number are housed at BPI and were numbered 327-1-4 to distinguish them. One of these specimens (327-1) differs from the others. Based on the leaf hairs, the host of this unique specimen was determined to be something other than *Q. virginiana*. The three other specimens labelled *P. atra* occur on *Q. virginiana*. The fungus on 327-2, 327-3, and 327-4 agrees in most characteristics with the description of *P. atra* in Eriksson (1981) based on the type specimen from K. In the BPI specimens interthecial tissue was observed as both irregular strands between the asci and septate hyphae above the asci intermixed with dark brown granules to form an epithecium. This observation is consistent with the descriptions of *P. atra* provided by Müller & von Arx (1962), von Arx & Müller (1975) and von Höhnel (1909). Confusion in the literature about the characteristics of *P. atra* may be due to the mixed collection issued as Ravenel, Fungi Americani Exsiccati no. 327.

Phillipsiella crescentiae and the recently described *P. bambusae* Katumoto (1986) differ from *P. atra* in that they lack a distinct excipulum. *Phillipsiella crescentiae* lacks any hyphal elements surrounding the asci and pseudoparaphyses. Rather the ascocarp is held together in a gelatinous matrix that may be produced by the host plant through the glandular hairs on the living leaves. *Phillipsiella bambusae* occurs superficially on living leaves of the bamboo *Pseudosasa japonica* (Sieb. & Zucc.) Makino. Like *Phillipsiella crescentiae, P. bambusae* has gelatinous, discoid ascomata that lack an ectal excipulum. In *P. bambusae*, the pseudoparaphyses are complexly branched at the apex forming an epithecium of blackened, intertwined apices of pseudoparaphyses that become "gelatinized and indistinct in the interascal portion" with age (Katumoto, 1986). In *P. crescentiae* the apices of the pseudoparaphyses are branched, inflated, and slightly darkened but do not form a true epithecium. Thus, *P. crescentiae* represents an even more reduced form of *Phillipsiella* than *P. bambusae*.

Like *Phillipsiella crescentiae*, several other species of *Phillipsiella* are associated with leaf hairs, including the type species, *P. atra*, which occurs among the hairs of *Quercus virginiana*. These fungi appear to be entirely superficial, not penetrating the cuticle or epidermis of the host. A number of other genera in the Phillipsiellaceae (as Saccardiaceae), Myriangiaceae, and Schizothyriaceae of the Dothideales *sensu* von Arx & Müller (1975) are associated with leaf hairs.

Phillipsiella crescentiae and *P. bambusae* appear morphologically similar to members of the genus *Plochmopeltis* Theissen (Katumoto, 1986). Despite its placement in the Schizothyriaceae by von Arx &

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Müller (1975), the asci and pseudoparaphyses of *P. intricata* (Ellis & Martin) Theissen, the type species of *Plochmopeltis*, do not appear to be enclosed in any kind of structure and this genus should perhaps be confamilial with *Phillipsiella*. On the other hand, ascomata of *Plochmopeltis intricata* lack any tissue subtending the hymenium and are thus considered nondiscoid by Müller & von Arx (1962).

Ordinal placement of the Phillipsiellaceae is problematic. The family Phillipsiellaceae with one genus *Phillipsiella* has recently been included in the Patellariales (Eriksson & Hawksworth, 1990, 1991), rather than the Dothideales *sensu lato* (von Arx & Müller, 1975) or the Arthoniales (Barr, 1987), each placement representing a different interpretation of the unusual characteristics of these fungi. The alliance of the Phillipsiellaceae with the Patellariales emphasizes the discoid nature of the ascocarp. The type species of *Patellaria, P. atrata*, and many other species included in the Patellariaceae have ascomata with a well developed exciple and are anatomically much more complex than species of the Phillipsiellaceae. In addition, members of the Patellariaceae occur on decorticated wood, quite unlike species of *Phillipsiella*. Barr (1987) placed the Phillipsiellaceae in the Arthoniales based on the lack of a peridium and occasional blueing in iodine of subhymenial regions in apothecia of some species. Biologically *Phillipsiella* as well as other genera in the Phillipsiellaceae (as the Saccardiaceae *sensu* von Arx & Müller, 1975) are unlike either the Arthoniales or Patellariales, rather they appear related to "fly speck" fungi that occur superficially on living leaf and fruit surfaces, usually placed in the Schizothyriaceae, Dothideales (von Arx & Müller, 1975) or Myriangiales (Barr, 1987), the latter family having "ascomata scutate or dimidiate" (von Arx & Müller, 1975).

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