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Janetia curviapicis, a new species, and an emended description of the genus

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Abstract: *Janetia curviapicis* sp. nov., occurring on submerged wood in Australia, is described and illustrated. It differs from the previously described *Janetia* species in the curved or circinate apices of the conidia. This new species is compared and contrasted with the other 16 species described in the genus. An expanded generic concept is introduced to include species with one or more of the following characteristics: synnematal conidiomata; monoblastic conidiogenous cells; schizolytic conidial secession; distoseptate, obclavate conidia; mycophilic habitat. A dichotomous key to the 15 accepted species of the genus is provided.

Key Words: dematiaceous hyphomycetes, deuteromycetes, litter fungi, systematics

INTRODUCTION

A dematiaceous hyphomycete on submerged wood collected from a stream in north Queensland, Australia has conidiogenous cells with conidiogenesis similar to those of *Janetia* M.B. Ellis (1976), but clearly differed from other species in the genus by producing conidia with curved or circinate apices.

Janetia was erected with *J. euphorbiae* M. B. Ellis (1976) as the type species. The genus has been circumscribed as having superficial nonhyphopodiate mycelium in which the conidiophores are micronematous and mononematous. The conidiophores give rise to short, polyblastic, integrated, intercalary, denticulate conidiogenous cells that are often thick-walled and darkly pigmented, and have flat, unthickened conidial scars. The conidia are solitary, typically obclavate, dematiaceous, phragmosporous, euseptate and lack a thickened hilum. The generic concept has been expanded through the addition of species. *Janetia mangiferae* S. Hughes & Cavalcanti (1983) has distinct polyblastic conidiogenous cells producing more or less ellipsoidal or cylindrical conidia; and *J. capnophila* S. Hughes (1983) has monoblastic conidiogenous cells. Two other species, *J. bacilliformis* Gamundí et al al. (Gamundí et al., 1979) and *J. refugia* B. Sutton & Pascoe (1988) both have monoblastic conidiogenesis and distoseptate conidia. Hughes (1983), in a review of the genus, transferred *Sporidesmium bonarii* M. B. Ellis (1958), *S. garryae* Bonar (1965) and *Pithomyces leprosus* Pirozynski (1972) to *Janetia*. In these three species conidiogenesis is mono- to biblastic or rarely polyblastic. Sivanesan and Hsieh (1990) further expanded the generic concept to include a synnematous species from Taiwan.

Sixteen species are currently included in *Janetia*. The genus is primarily tropical or subtropical, with species reported from Argentina, Australia, Brazil, China, Cuba, Japan, Kenya, New Zealand, Taiwan, North America and Tanzania. Most of the species are reported from either living or dead dicotyledonous leaves, though five species, viz. *J. euphorbiae* (Ellis, 1976), *J. canescens* B. Sutton & Pascoe (1988), *J. mangiferae* (Hughes and Cavalcanti, 1983), *J. refugia* (Sutton and Pascoe, 1988), and *J. synnematosa* Sivanesan & Hsieh (1990) are reported from stems or branches. Amongst the foliicolous species, only *J. capnophila* (Hughes, 1983) and *J. interna* Swart (1985) were reported to have close associations with other fungi. The former is a mycophile associated with sooty moulds, especially with species of *Euantennaria* Speg. and *Acrogenotheca elegans* (Fraser) Cif. & Bat. The latter was highlighted as a possible mycoparasite on the acervuli and ascomata of *Discostromopsis stoneae* H.J. Swart. *Janetia mangiferae*, described from the base of petiole and periderm of branches of *Mangifera* sp., is closely associated with a species of the ascomycete genus *Stomiopeltis* Theiss., but mycoparasitism was not determined.

Schizolytic conidial sucession, as defined by Cole and Samson (1979), occurs in most, if not all, species of *Janetia* (Hughes, 1983; Hughes and Cavalcanti, 1983; Kirk, 1985; Swart, 1985). Although conidial secession in *J. cubensis* Matsushima (1987) was also described as "schizolytic", implying that the process involves a splitting of the delimiting septum of the conidiogenous cell, the illustration (Fig. 438 in Matsushima, 1987) suggests that the conidial secession is in fact "rhexolytic", a process involving cir-

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cumcissile rupture or breakdown of the longitudinal wall of the cell below the conidium. Moreover, the conidiogenous "denticles" in *J. cubensis* do not appear to be bulbous, thick-walled and heavily pigmented, as do those of other *Janetia* species. It is unlikely that *J. cubensis* belongs to *Janetia.*

Janetia tetracentri Y. L. Guo (1989) occurring on living leaves of *Tetracentron sinense* Oliv. was described as a new species from China. It was regarded by Guo (1989) as closest to *J. faureae* (Piroz.) M. B. Ellis (1976) and *J. longispora* Kirk (1985) but differs from the former species in having longer conidia, and from the latter in having narrower conidia. Both *J. tetracentri* and *J. faureae,* however, produce conidia that are about of the same width (ca. 4–5 μm). Since conidial length may vary extensively according to different degrees of relative humidity in the environment, the conidial width is regarded as the more stable taxonomic character rather than the conidial length. We believe that *J. tetracentri* is synonymous with *J. faureae* because they share many characteristics: a foliicolous habitat; brown, effuse colonies on the lower leaf surface; brown, polyblastic conidiogenous denticles borne on superficial mycelium; narrowly obclavate conidia with a long/rostrate, hyaline apex, with one or two of the conidial cells becoming conidiogenous (Pirozynski, 1972; Ellis, 1976; Guo, 1989).

In this paper, the broader generic concept of *Janetia* is formalized. Species producing obclavate or cylindric, euseptate or distoseptate, phragmosporous conidia from dematiaceous, denticulate conidiogenous cells are now included. These conidiogenous cells are monoblastic and/or polyblastic, borne on conidiophores that are usually integrated and single, but may also be distinct and even aggregated in synnematal conidiomata. The conidial secession is schizolytic. Their habit may be foliicolous, caulicolous, lignicolous, or fungicolous. This expanded generic concept accommodates our new lignicolous, mycophilic hyphomycete from Australia in *Janetia.* As *J. tetracentri* is regarded as synnonymous to *J. faureae,* the characters of the 16 known *Janetia* species are compared and contrasted in TABLE I with composite illustrations in FIGS. 1–16. Kirk (1985) keyed out nine of the species using only conidial size and numbers of septa. Because of the new characters found in *Janetia,* we emend the description of *Janetia* and provide a new key. Because *J. cubensis* is anomalous in the genus, it is omitted from the key.

TAXONOMY

JANETIA M. B. Ellis, gen. emend., *fide* Ellis (1976), Hughes (1983), Hughes and Cavalcanti (1983), Kirk (1985), Swart (1985), Sutton and Pascoe (1988), and Sivanesan and Hsieh (1990).

Habitat foliicolous, caulicolous, lignicolous, mycophilic or mycoparasitic. *Colonies* effuse, scattered, thin, dark brown to black. *Mycelium* superficial or partly immersed, composed of a network of branched and anastomosing, septate, olivaceous or dark brown hyphae. *Stroma* none. *Setae* absent. *Hyphopodia* lacking. *Conidiophores* integrated or distinct, single or forming synnematal conidiomata. *Conidiogenous cells* denticulate, integrated, terminal or intercalary, solitary or aggregated, monoblastic or polyblastic; denticles large, usually thick-walled, darkly pigmented, flat-topped, cicatrices not thickened, conidiogenous loci apparently not proliferating. *Conidial ontogeny* holoblastic, acrogenous. *Conidial maturation* synchronous with conidial ontogeny. *Conidial secession* schizolytic. *Conidia* solitary, dematiaceous, obclavate, cylindric or rarely cylindric, 2- to transversely multiseptate, euseptate or distoseptate or both, smooth or verruculose, basal cell may or may not be protuberant but is usually conspicuously darker than the other cells, without a conspicuously thickened hilum.

Janetia curviapicis Goh & K. D. Hyde, sp. nov. Figs. 3, 17–30

Coloniae in ligno submerso disseminatae, brunneae vel atro-brunneae. Mycelium partim superficiale, partim in substrato immersum, sparsum, frequenter cum alio hyphomycete in ligno consociatum vel concretum. Hyphae 1.5–2.5 latae, pallide vel atro olivaceo-brunneae, ramosae, septatae, cellulae conidiogenae intercalariter gerentes. Seta et hyphopodia nulla. Conidiophora micronematosa, mononematosa. Cellulae conidiogenae in coniophoris incorporatae, denticulatae, plerumque intercalares, ex hyphis conidiophoris lateraliter producentes, discretae vel gregares, monoblasticae vel polyblasticae, determinatae, cylindricae, rectae, atro-brunneae vel fere nigrae, uniformes in coloratione, crassitunicatae, non verruculosae, (5)-8-10-(12) × 2–3.5 μm, basim 5–6.5 μm latae, apicem 2–3 μm latae et truncatae; cicatrices conidiales planae, non incrassatae, ca 2–3 μm latae. Conidiorum secessio schizolytica. Conidia 65–100 × 5.5–7.5 μm, holoblastica, solitaria, sicca, obclavata, rostrata, 6–12-euseptata et 4–9-distoseptata, pallide olivaceo-brunnea, apicem versus gradatim pallidiora; apice acicularia, curvata vel circinata; cellula basali 3–5 × 2–3.5 μm, conspicue atriora, obtrapezoidea, in hilum truncatum non incrassatum breviter attenuata.

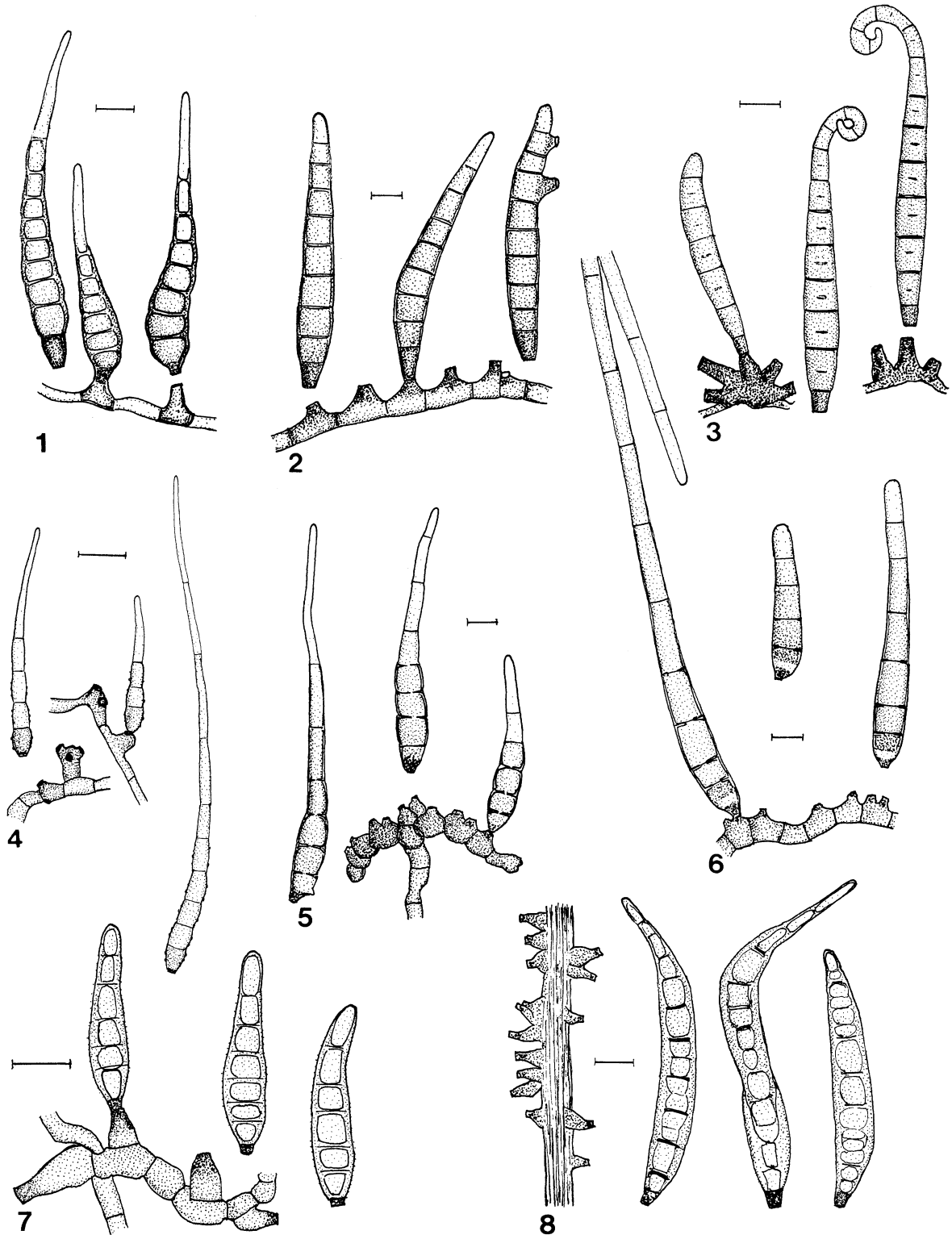
HOLOTYPUS. AUSTRALIA. QUEENSLAND: Cow Bay, in ligno submerso rivuli, April 1995, *T. M. Hyde et K. D. Hyde,* BRIP 23223.

Etymology. curviapicis (Latin)—referring to the conidia that are always distally curved or circinate.

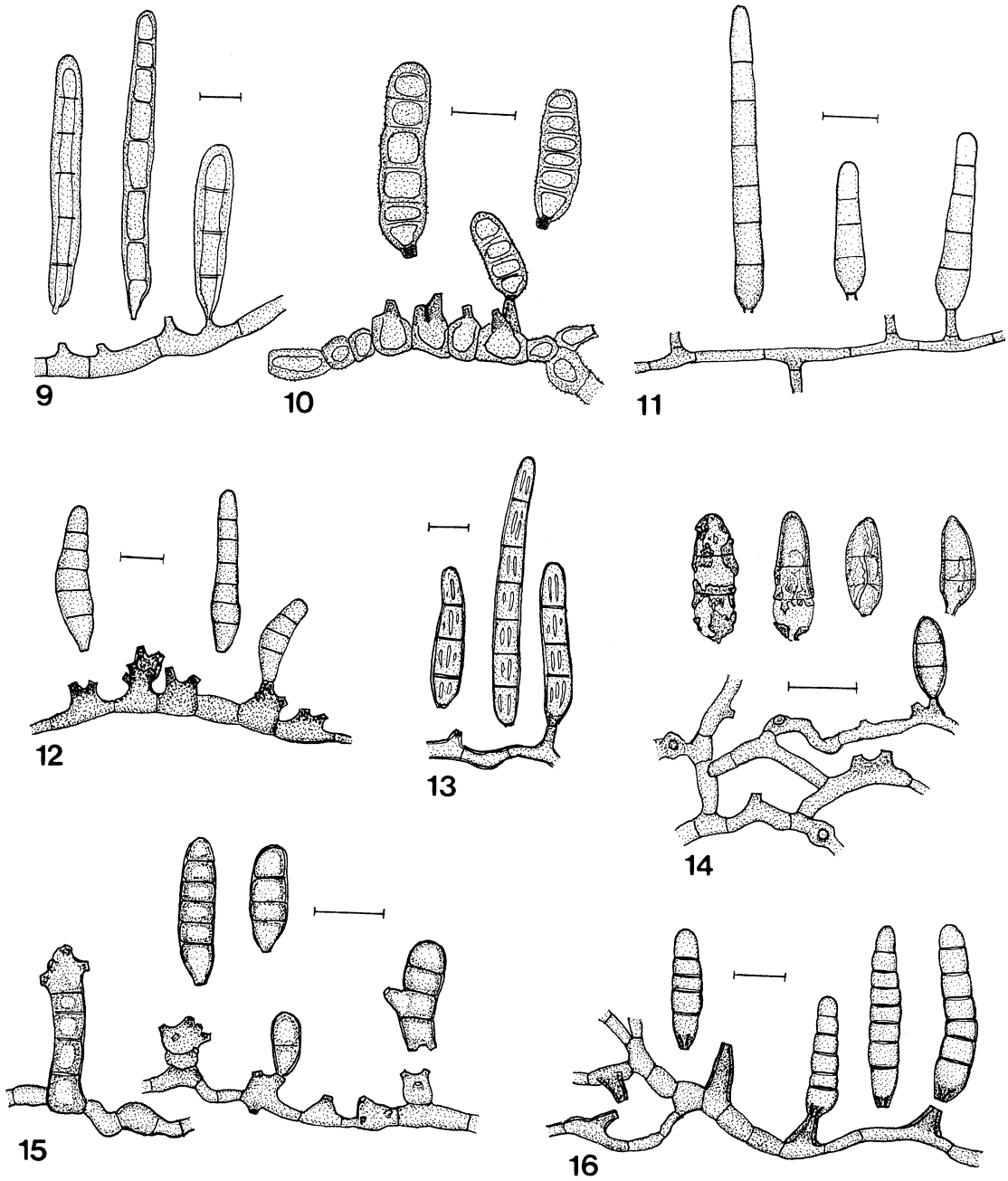
Colonies on submerged wood scattered, brown to dark brown. *Mycelium* partly superficial, partly immersed in the substratum, sparse, often associated or growing on other hyphomycetes (FIGS. 20, 25). *Hyphae* 1.5–2.5 μm wide, pale to dark olivaceous brown, branched, septate, bearing intercalary, dark,

TABLE I. Synopsis of *Janetia* species

Species	Conidial shape, septation and size (μm)	Conidial basal cell protruding/darker	No. of conidiogenous denticles	Habitat	Association with other fungi	Locality	Outstanding key feature
bacilliformis	cylindric/5–9 distoseptate/60–156 × 5–9	yes/no	1, rarely 2	leaves	unknown	Argentina	rod-shaped distoseptate conidia
bonarii	obclavate/5–12 septate/55–95 × 10–12	yes/yes	2, rarely 1 or 3	leaves	unknown	U.S.A.	—
canescens	cylindric/1–7 distoseptate/16–57 × 5.5–9	yes/yes	1–2	living branches	unknown	Australia	conidia and vegetative hyphae verrucose
capnophila	obclavate/7–16 septate/58–145 × 10.8–16.2	no/yes	1	leaves	yes	New Zealand	mycophilic to sooty moulds
cubensis	cylindro-obclavate/2–8 septate/16–77 × 5–8	(doubtful)	1	dead palm rachids	unknown	Cuba	basal septum in "denticles"
curviapicis	obclavate/6–12 septate/65–100 × 5.5–7.5	no/yes	1–3 or more	submerged wood	yes	Australia	conidial apex curved or circinate
euphorbiae	cylindro-obclavate/3–6 septate/18–36 × 6–8	no/no	1–5	stem	unknown	Tanzania	—
faureae	long obclavate/3–9 septate/50–120 × 4–5	no/yes	1–3	fallen leaves	unknown	Tanzania	conidia rostrate, verrucose at base
garryae	cylindric/2–6 septate/25–70 × 6–8.5	no/yes	1–2, rarely 3	leaves	unknown	U.S.A.	longitudinal warts on conidial wall
interna	obclavate/5–8 septate/57–128 × 10–11	yes/yes	1–2	dead leaves	yes	Australia	mycoparasitic on ascomycetes/coelomycetes
leprosa	ellipsoid/2–3 septate/10–17 × 3.5–4	no/no	2–3	dead leaves	unknown	Tanzania	epispore of conidia cracking
longispora	obclavate/6–12 septate/90–285 × 10–15	yes/yes	1–2, rarely 3	dead leaves	unknown	Kenya	subhyaline band in basal cell of conidia
mangiferae	cylindro-obclavate/1–5 septate/8.5–23 × 4.3–6	no/no	2–6	petiole/branches	yes	Brazil	conidiogenous cells up to 6 denticles
matsushimae	cylindric/4–7 septate/20–31.5 × 5–6	no/yes	1	dead leaves	unknown	Japan	distinctly contricted at septa
refugia	obclavate/4–6 distoseptate/31–37 × 7–8	yes/yes	1	living branches	unknown	Australia	conidia finely verrucose
synnematosa	obclavate/9–22 distoseptate/80–115 × 10–12.5	no/yes	1 or more	dead herbaceous stem	unknown	Taiwan	synnematous conidiophores

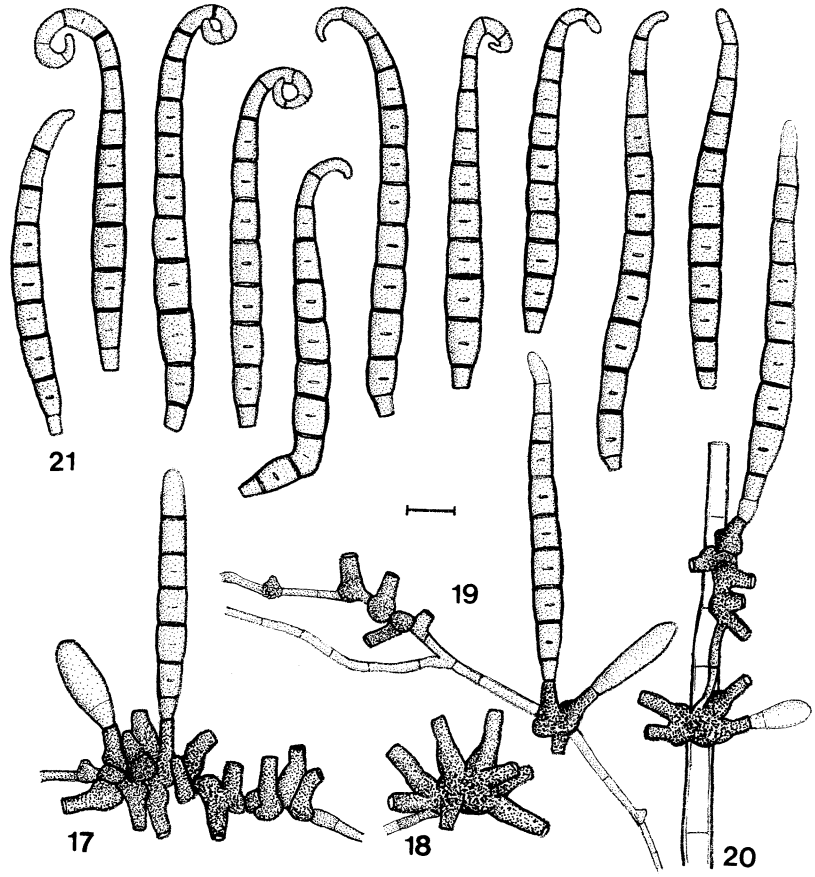


FIGS. 1–8. Species of *Janetia* with obclavate conidia. 1. *J. bonarii,* redrawn with reference to Ellis (1958). 2. *J. capnophila,* redrawn with reference to Hughes (1983). 3. *J. curviapicis.* 4. *J. faureae,* redrawn with reference to Ellis (1976). 5. *J. interna,* redrawn with reference to Swart (1985). 6. *J. longispora,* redrawn with reference to Kirk (1985). 7. *J. refugia,* redrawn with reference to Sutton and Pascoe (1988). 8. *J. synnematosa,* drawn with reference to photographs in Sivanesan and Hsieh (1990). Bars = 10 μm.

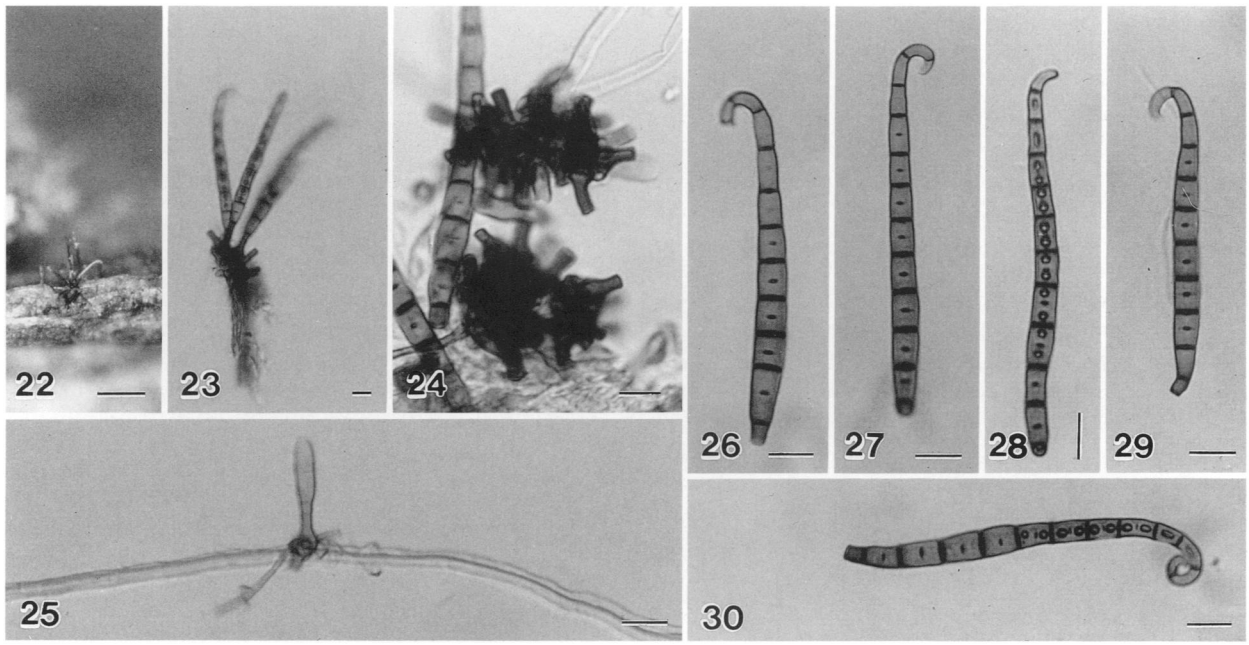


FIGS. 9–16. Species of *Janetia* with cylindric conidia. 9. *J. bacilliformis,* redrawn with reference to Gamundí et al. (1979). 10. *J. canescens,* redrawn with reference to Sutton and Pascoe (1988). 11. *J. cubensis,* redrawn with reference to Matsushima (1987). 12. *J. euphorbiae,* redrawn with reference to Ellis (1976). 13. *J. garryae,* redrawn with reference to Ellis (1976). 14. *J. leprosa,* redrawn with reference to Pirozynski (1972). 15. *J. mangiferae,* redrawn with reference to Hughes and Cavalcanti (1983). 16. *J. matsushimae,* redrawn with reference to Matsushima (1975). Bars = 10 μm.

denticulate conidiogenous cells. *Setae* absent. *Hyphopodia* lacking. *Conidiophores* micronematous, mononematous. *Conidiogenous cells* integrated, mostly intercalary, denticulate, solitary or clustered, monoblastic to polyblastic, determinate, cylindrical, straight, dark brown to almost black, uniform in color, thicked-walled, not verruculose, (5-)8-10(-12) × 2–3.5 μm, 5–6.5 μm wide at the bulbous base, apex 2–3 μm wide and truncate, not cicatrized. Conidial secession schizolytic. *Conidia* 65–100 × 5.5–7.5 μm, holoblastic, solitary, dry, pale olivaceous brown, obclavate, rostrate, gradually tapered towards a paler, acicular, curved or circinate apex, basal cell 3–5 × 2–3.5 μm, conspicuously darker than the rest of the



FIGS. 17–21. *Janetia curviapicis*. 17–19. Conidiogenous cells with developing conidia. 20. Conidiogenous cells and developing conidia on hypha of another hyphomycete 21. Conidia. Bar = 10 μm.



FIGS. 22–30. Light micrographs of *Janetia curviapicis*. 22. Habit. 23. Conidia and conidiogenous cells. 24. Conidiogenous cells. 25. Conidiogenous cells and hypha on mycelium of another fungus. 26–30. Conidia. Bars: 22 = 100 μm, 23–30 = 10 μm.

conidium cells, obtrapezoidal, tapered to an obconically truncate base, hilum not thickened; 6-12-euseptate and 4-9-distoseptate, true septa thickened (up to ca 1 μm thick) and appearing as dark bands, individual cells slightly constricted at these septa; except for the basal cell and those comprising the apex of the conidium, each conidial segment incorporating a single central distoseptum (FIGS. 3, 21, 26–30), this distoseptum appearing as a short transverse disc (ca 1–1.5 μm long) positioned between two true septa, the conidium segmented, with alternate eusepta and distosepta.

KEY TO 15 SPECIES OF *JANETIA*

1. Conidiophores macronematous, synnematous ..... *J. synnematosa*
1. Conidiophores micronematous, mononematous 2
2. Conidia verruculose or with longitudinal warts 3
2. Conidia smooth 6
3. Conidia coarsely verruculose or warted, euseptate; occurring on fallen leaves 4
3. Conidia finely verruculose, distoseptate; occurring on living branches 5
4. Conidia with long hyaline apex, verruculose only near the base, 50–120 × 4–4.5 μm ..... *J. faureae*
4. Conidia lacking attenuated apex, verruculose with warts arranged in longitudinal rows, 25–70 × 6–8.5 μm ..... *J. garryae*
5. Conidia cylindric, 16–57 × 5.5–9 μm, vegetative hyphae finely verruculose ..... *J. canescens*
5. Conidia obclavate, 31–37 × 7–8 μm, vegetative hyphae smooth ..... *J. refugia*
6. Conidial apex curled or circinate; occurring on submerged wood ..... *J. curviapicis*
6. Conidial apex and habitat not as above 7
7. Conidia ellipsoidal or more or less cylindrical; conidial width not more than 9 μm 8
7. Conidia distinctly obclavate; conidial width at least 10 μm 12
8. Conidia ellipsoidal or fusoid, 2–3 septate; conidial width not more than 4 μm; epispore cracking ..... *J. leprosa*
8. Conidia cylindrical or cylindro-obclavate, usually more than 3-septate; conidial width usually more than 4 μm; epispore intact 9
9. Conidiogenous cells distinctly polyblastic; occurring on petioles, stems or branches 10
9. Conidiogenous cells monoblastic; occurring on leaves 11
10. Conidia 18–36 × 6–8 μm ..... *J. euphorbiae*
10. Conidia 8.5–23 × 4.3–6 μm ..... *J. mangiferae*
11. Conidia 20–31 × 5–6 μm, euseptate, constricted at septa ..... *J. matsushimae*
11. Conidia 60–156 × 5–9 μm, distoseptate, not constricted at septa ..... *J. bacilliformis*
12. Conidia 90–285 μm long, distinct subhyaline band in basal cell ..... *J. longispora*
12. Conidia not exceeding 145 μm long, basal cell lacking subhyaline band 13
13. Conidia broader (11–16 μm), apex not rostrate; associated with sooty moulds ..... *J. capnophila*
13. Conidia slender (ca. 10 μm), apex rostrate and pale; not associated with sooty moulds 14
14. Conidiogenous cells bulbous; mycoparasitic on *Discostromopsis*; conidia 57–128 μm long ..... *J. interna*
14. Conidiogenous cells not bulbous; conidia 55–95 μm long ..... *J. bonarii*

DISCUSSION

Besides *Janetia,* many other dematiaceous hyphomycetes produce more or less obclavate conidia on superficial denticulate conidiogenous cells, such as, *Ceratophorum* Sacc. (Hughes, 1951), *Clasterosporium* Schwein. (Ellis, 1958), and many species of *Sporidesmium* Link (Ellis, 1971, 1976). *Ceratophorum helicosporum* (Sacc.) Sacc. and *C. uncinatum* (Clinton) Sacc. produce obclavate, distoseptate conidia with uncinate apices very similar to those of *J. curviapicis.* There are, however, distinct hyphopodia on the superficial hyphae in species of *Ceratophorum* and *Clasterosporium,* an essential character of the two genera (Hughes, 1951). The troublesome "*Ceratophorum epiphyllum* (Schw.) Sacc." has conidia comparable in shape to those of *J. curviapicis* with curled apices, but hyphopodia are lacking. The systematic position of "*C. epiphyllum*" is in fact ambiguous as it has not been suitably placed in any of the genera such as *Ceratophorum, Clasterosporium, Coryneum* Nees, *Helminthosporium* Link or *Sporidesmium* (Hughes, 1951). It could be placed in *Janetia* as its conidiogenous characters and conidial morphology are comparable to species of *Janetia.* "*Ceratophorum epiphyllum*", however, is distinct from *J. curviapicis* in having smaller conidiogenous loci and broader conidia (8.5–10 μm).

Several species of *Sporidesmium,* such as *S. ehrenbergii* M. B. Ellis, *S. filiferum* Piroz. and *S. subulatum* (Cooke & Ellis) S. Hughes, also have obclavate conidia that are both euseptate and distoseptate, similar to those of *J. curviapicis.* We feel that the taxonomic

position of many species currently disposed in *Sporidesmium* is ambiguous, because some species could be classified in *Janetia* on the basis of their short conidiophores that may be reduced to conidiogenous cells. Hughes (1983) observed that *Sporidesmium* is predominately a genus of species that occur on wood and bark with immersed mycelium bearing macronematous conidiophores and conidiogenous cells that proliferate percurrently. He proposed that those foliicolous species with monoblastic conidiogenous cells should be segregated. Subramanian (1992), in a reassessment of *Sporidesmium* and some related taxa, accepted this concept (Hughes, 1983) and named *Janetia matsushimae* Subraman. based on a foliicolous *Sporidesmium* sp. described by Matsushima (1975), in which the conidiogenous cells are monoblastic. Sutton and Pascoe (1988) observed that the conidiogenous cells in many species of *Janetia* are frequently thicker-walled and darker than the vegetative mycelium on which they are borne. They suggested that these features could distinguish *Janetia* from *Sporidesmium* and pointed to the potential transfer to *Janetia* of several species that were then included in *Sporidesmium*. In many species of *Janetia*, the basal cell of the conidium may or may not be protuberant, but is conspicuously darker than other cells of the conidium. Hughes (1983) and Hughes and Cavalcanti (1983) recorded that in many species of *Janetia*, such as *J. capnophila, J. bonarii, J. faureae, J. garryae,* and *J. mangiferae,* one or more of the conidium cells may function as monoblastic conidiogenous cells. The darker basal cells and the conidiogenous cells in a conidium, may be unique to *Janetia* and separate it from *Sporidesmium*.

Sporidesmina malabarica Subramanian & Bhat (1987) has been described from India to accommodate a dematiaceous hyphomycete that has dark brown, thick-walled, short conidiogenous cells that are integrated in synnematal conidiomata, and that produces solitary, obclavate conidia with both eusepta and distosepta. This fungus could be transferred to *Janetia* since its morphology and conidiogenesis fit the emended generic concept of *Janetia* (Nawawi, personal communication).

Two other genera, *Chuppia* Deighton and *Hirudinaria* Cesati, also have similar types of denticulate conidiogenous cells comparable to those of *Janetia*, but species of these genera have muriform and forked conidia, respectively. The similarity of conidiogenous cells and at least partially distoseptate conidia of *Chuppia, Hirudinaria, Sporidesmium* and *Janetia* leads us to the conclusion that these fungi, indeed, form a natural phylogetic group.

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