

## ***Yinmingella mitriformis* gen. et sp.nov., a new sporodochial hyphomycete from submerged wood in Hong Kong**

**T.K. Goh, K.M. Tsui, and K.D. Hyde**

**Abstract:** *Yinmingella mitriformis* gen. et sp.nov. (Hyphomycetes), occurring on wood submerged in Tung Chung River on Lantau Island, Hong Kong, is described and illustrated. It is unique in producing short, true chains of holoblastic, aseptate, smooth, black, mitriform conidia from dark brown, flask-shaped conidiogenous cells on hemispherical, black stromata. *Yinmingella* is compared with *Hemibeltrania*, *Hemicorynespora*, *Mammaria*, *Janetia*, *Sporidesmium*, and *Stanjehughesia*.

**Key words:** cryo-SEM, dematiaceous Hyphomycetes, freshwater fungi, mitosporic fungi, systematics.

**Résumé :** Les auteurs décrivent et illustrent l'*Yinmingella mitriformis* gen. et sp.nov. (Hyphomycètes), trouvé sur du bois submergé dans la rivière Tung Chung sur l'île de Lantau, à Hong Kong. Il est unique en ce qu'il produit des conidies courtes, en véritables chaînes holoblastiques, aseptées, lisses, noires et mitriformes, à partir de cellules conidiogènes brun foncé, en forme de bouteille et venant sur des stromas noirs et hémisphériques. Ils comparent l'*Yinmingella* avec les *Hemibeltrania*, *Hemicorynespora*, *Mammaria*, *Janetia*, *Sporidesmium* et *Stanjehughesia*.

**Mots clés :** cryo-microscopie par balayage, Hyphomycètes dématiés, champignons d'eau douce, champignons mitosporiques, systématique.

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### **Introduction**

During a survey of microfungi occurring on wood submerged in Tung Chung River in Lantau Island, Hong Kong, we found an apparently undescribed dematiaceous hyphomycete. Observations of squash mounts in water and lactophenol, and an ultrastructural study using a cryo-scanning electron microscope, revealed that the fungus is unique amongst the hyphomycetes. It produces chains of black, glistening conidia in sporodochial conidiomata, on the surface of submerged wood. Conidiophores are absent or reduced to flask-shaped conidiogenous cells on a black stroma. The conidia are holoblastic, aseptate, smooth, dark brown to black, mitriform, and secede by schizolysis. Although the conidiogenous cells are flask-shaped, they are not "phialides" (sensu Minter et al. 1983) and do not proliferate. The combination of these morphological characters excludes this fungus from any of the existing genera of Hyphomycetes. We therefore introduce *Yinmingella* as a new genus to accommodate this beautiful, unique hyphomycete.

### **Taxonomy**

*Yinmingella* Goh, K.M. Tsui & K.D. Hyde, gen.nov.

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**ETYMOLOGY:** *Yinmingella*, derived from the name of the senior author's wife, Yin-Ming Leong, for her appreciation and support of his work in mycology.

Ad fungos conidiales, Hyphomycetes, pertinens. Coloniae in substrato naturali punctiformes, atrae, nitidae. Mycelium superficiale et in substrato immersum. Setae nullae. Hyphopodia absentia. Stromata bene evoluta, hemisphaerica, atrobrunnea vel atra. Conidiophora absentia. Cellulae conidiogenae discretiae, determinatae, monoblasticae, modice brunnea vel atrae, crassitunicatae, laeves, lageniformes. Conidia holoblastica, acrogena, catenulata, dematiacea, aseptata, mitriformia vel limoniformia, aseptulata, conidiorum secessio schizolytica.

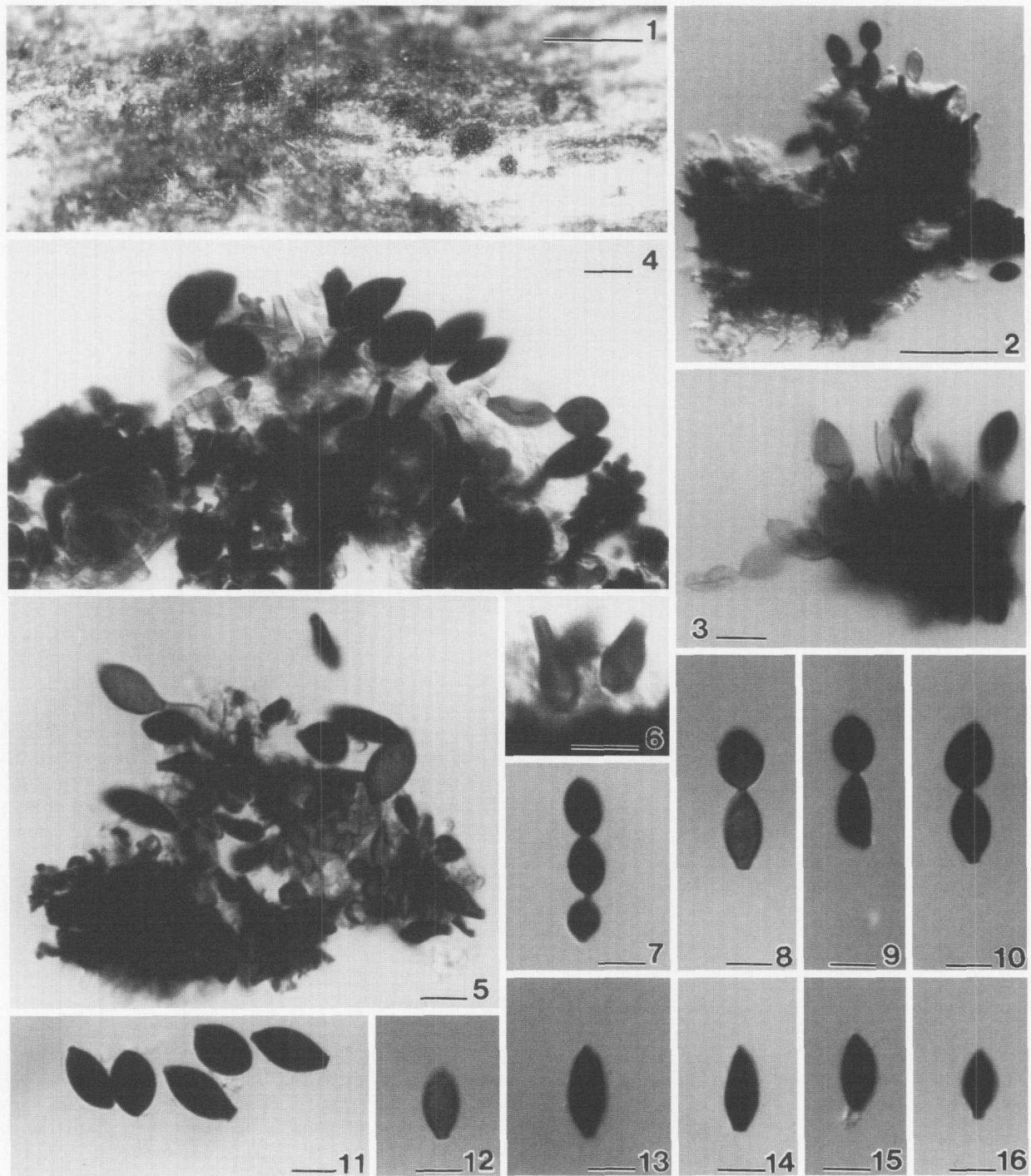
**SPECIES TYPICA:** *Yinmingella mitriformis* Goh, K.M. Tsui & K.D. Hyde

Conidial fungi, Hyphomycetes. Colonies on natural substratum punctiform, black, glistening. Mycelium superficial and immersed in the substratum. Setae and hyphopodia absent. Stromata well developed, hemispherical, dark brown to black. Conidiophores absent. Conidiogenous cells discrete, determinate, monoblastic, medium brown to black, thick-walled, smooth, lageniform. Conidia holoblastic, acrogenous, catenulate, dematiaceous, unicellular, mitriform to limoniform, aseptulate, seceding by schizolysis.

*Yinmingella mitriformis* Goh, K.M. Tsui & K.D. Hyde, sp.nov. (Figs. 1–28)

**ETYMOLOGY:** mitriformis (Latin) = mitre like in form, helmet-shaped, referring to the shape of the conidia.

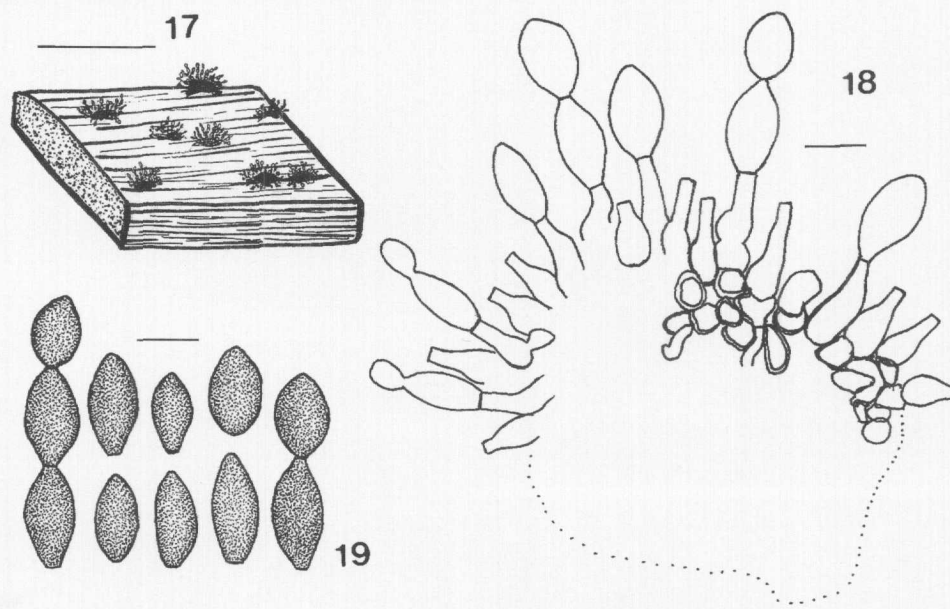
**Figs. 1–16.** Light micrographs of *Yinmingella mitriformis* from holotype. Fig. 1. A portion of the colonies on natural substratum. Figs. 2 and 3. Black stromata bearing conidiogenous cells and conidia. Figs. 4 and 5. Squash mounts of stromata illustrating flask-shaped, black conidiogenous cells, and developing conidia. Fig. 6. Closer view of conidiogenous cells. Figs. 7–10. Conidia in chains of two and three (Fig. 7). Figs. 11–16. Conidia. Scale bars: Fig. 1 = 200  $\mu\text{m}$ ; Fig. 2 = 50  $\mu\text{m}$ ; Figs. 3–16 = 10  $\mu\text{m}$ .



Coloniae in substrato naturali atrae, punctiformes, nitidae. Stromata hemisphaerica, 35–65  $\mu\text{m}$  lata, 25–40  $\mu\text{m}$  alta, atrobrunnea vel atrae, saepe opaca, ex cellulis globosis, atrobrunneis, crassitunicatis, 4–7  $\mu\text{m}$  latis, et hyphis, laevibus, 2–3  $\mu\text{m}$  latis, compositum. Conidiophora absentia. Cellulae conidiogenae modice brunneae vel atrae, crassitunicatae,

laeves, lageniformes, 7–18(–20)  $\mu\text{m}$  longae, ad basem bulbosae et 5–6  $\mu\text{m}$  latae, superne cylindricae et 2.5–3  $\mu\text{m}$  latae. Conidia solitaria vel breve catenulata, atrobrunnea vel atra, saepe opaca, aseptata, plerumque mitriformia, illa secundaria et tertia internum plus minusve limoniformia, (12–)14–20  $\times$  6–10  $\mu\text{m}$ , crassitunicata, laevia.

**Figs. 17–19.** Diagrammatic representation of *Yinmingella mitriformis* from holotype. Fig. 17. Colonies on natural substratum. Fig. 18. Stroma bearing ampulliform conidiogenous cells and chains of conidia. Stippling omitted. Fig. 19. Conidia. Scale bars: Fig. 17 = 200  $\mu\text{m}$ ; Figs. 18 and 19 = 10  $\mu\text{m}$ .



**HOLOTYPE:** HONG KONG: Lantau Island, Tung Chung River, on submerged wood, 28 July 1997, K. M. Tsui, KM224 (HKU(M) 8042).

Colonies on natural substratum scattered or sparsely aggregated, minute, punctiform, black, glistening (Figs. 1, 17, and 20). Mycelium partly superficial and partly immersed in the substratum, composed of subhyaline to pale brown, smooth, 2–3  $\mu\text{m}$  wide, smooth, branched hyphae. Stromata well developed, hemispherical, 35–65  $\mu\text{m}$  wide, 25–40  $\mu\text{m}$  tall, dark brown to black, usually opaque, composed of a mixture of compact, isodiametric, 4–7  $\mu\text{m}$  wide, dark brown to almost black, thick-walled pseudoparenchymatous cells and interwoven, pale to medium brown, 2–3  $\mu\text{m}$  wide, smooth hyphae (Figs. 2–5, 18, 21, and 22). Conidiophores absent. Conidiogenous cells discrete, determinate, monoblastic, medium brown to black, thick-walled, smooth, lageniform, flat-topped, 7–18(–20)  $\mu\text{m}$  long, 5–6  $\mu\text{m}$  wide at the bulbous base, 2.5–3  $\mu\text{m}$  wide at the cylindrical neck (Figs. 4–6, 18, and 26). Conidia acrogenous, holoblastic, solitary or in chains of two or three, very dark brown or black, usually opaque, not septate, predominantly mitriform, secondary or tertiary conidia sometimes more or less limoniiform, (12–)14–20  $\times$  6–10  $\mu\text{m}$ , thick-walled, smooth, seceding by schizolysis (Figs. 7–16, 19, and 23–28).

**TELEOMORPH:** Unknown.

**KNOWN DISTRIBUTION:** Hong Kong.

Note that attempts to grow this fungus in culture were unsuccessful.

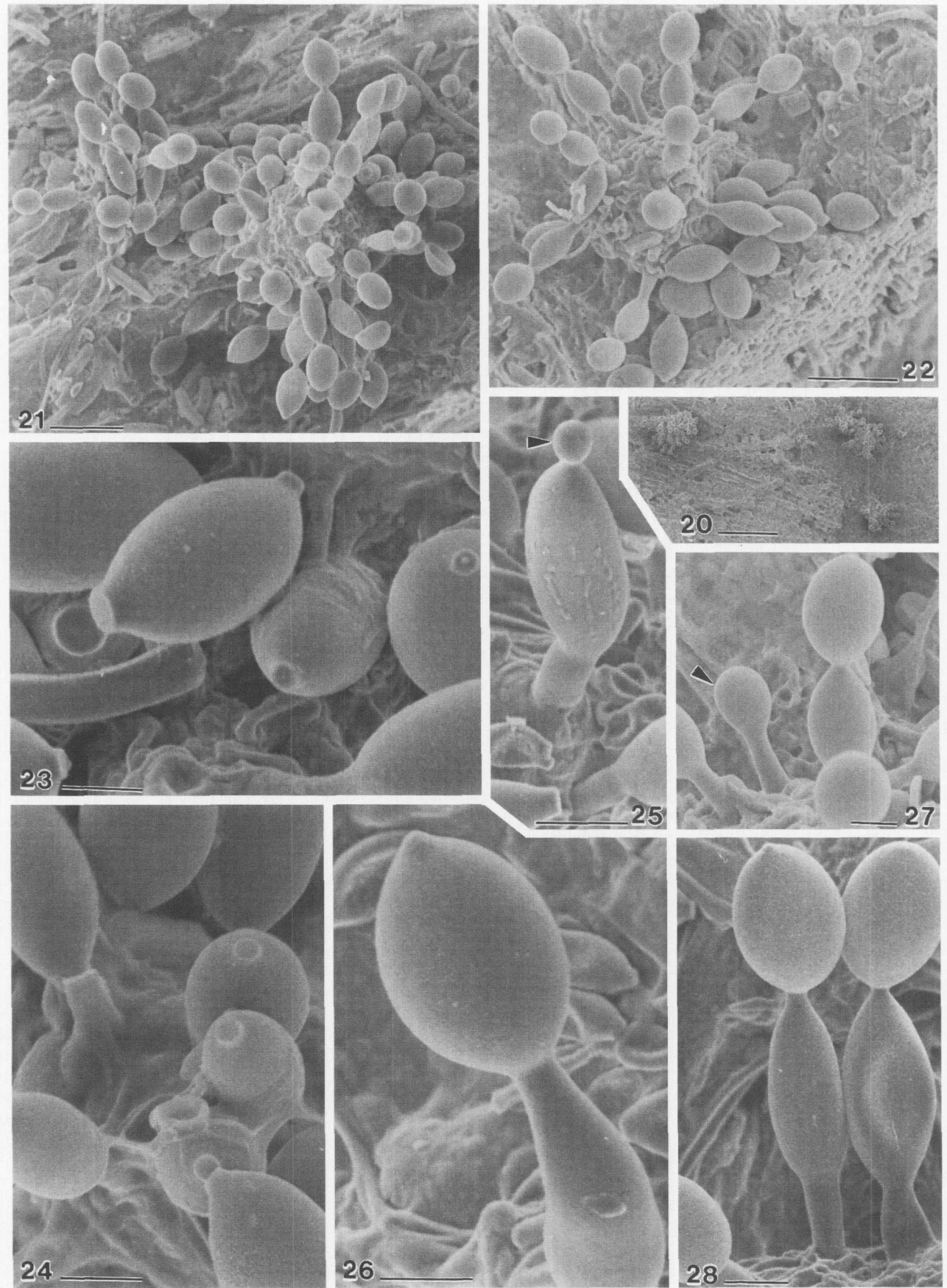
## Discussion

*Yinmingella mitriformis* is unique amongst all known genera of Hyphomycetes and possesses a unique combination of conidial, conidiogenous, conidiophore, and structural char-

acters (Carmichael et al. 1980). These include (i) sporodochial colonies, in which sporulation occurs on a black, hemispherical stroma; (ii) absence of distinct conidiophores, where conidia are produced from discrete, flask-shaped, flat-topped, darkly pigmented, nonproliferating conidiogenous cells; (iii) holoblastic, unicellular, aseptate, aseptulate, smooth, black, mitriform conidia that are borne in short chains; and (iv) schizolytic conidial secession.

Only a few hyphomycetes produce unicellular, mitriform conidia that are comparable to those of *Yinmingella*, such as *Hemicorynespora deightonii* M.B. Ellis, *Hemibeltrania cinnamomi* (Deighton) Piroz., *Hemibeltrania nectandrae* (Bat. & Maia) Piroz., *Mammaria echinobotryoides* Cesati, and *Mercadomyces camagiueyense* Mena. Species of *Hemicorynespora* M.B. Ellis differ from *Yinmingella* in having solitary, erect, septate conidiophores with distinct annellations resulting from percurrent proliferations of their conidiogenous cells (Ellis 1972, 1976). Similarly, species of *Hemibeltrania* Piroz. differ from *Yinmingella* in having distinct conidiophores arising from radially lobed basal cells, with conidiogenous denticles at the apex (Pirozynski 1963). Species of *Mammaria* Ces. ex Rabenh. are distinct in having solitary conidia with an elongated germ slit, sessile on micro-nematous or semi-macronematous conidiophores, and are often associated with a "phialidic" synanamorph (Ellis 1971; Matsushima 1975). *Mercadomyces camagiueyense* differs from *Yinmingella* in its synnematous conidiomata, which bear distinct conidiophores with clavate to doliiform, monotretic conidiogenous cells that proliferate percurrently and with distinct conidial scars (Mercado Sierra et al. 1997).

The flask-shaped, flat-topped, determinate, black conidiogenous cells ("denticles") in species of *Janetia* M.B. Ellis (Ellis 1976; Goh and Hyde 1996) are also comparable with the conidiogenous cells of *Yinmingella*. In *Janetia*, the conidiogenous cells can be monoblastic or polyblastic and can be discrete or grouped, and the conidia are phragmosporous.



**Figs. 20–28.** Cryo-fixed scanning electron micrographs of *Yinmingella mitriformis* from holotype. Fig. 20. Sporodochia on natural substratum. Figs. 21 and 22. Higher magnification of sporodochia showing conidiogenous cells and chains of conidia. Figs. 23 and 24. Conidia, showing details of conidial scars at their ends after schizolytic conidial secession. Fig. 25. A primary conidium at the tip of a conidiogenous cell in the process of giving rise to a secondary conidium (arrowed) at its apex. Fig. 26. Close-up of an ampulliform conidiogenous cell bearing a holoblastic, smooth-walled conidium. Fig. 27. Holoblastic, acrogenous conidial development. Arrow shows the developing young conidium at the apex of a conidiogenous cell. Note that the conidial wall is continuous with the wall of the conidiogenous cell. Fig. 28. Developing conidia in chains. Scale bars: Fig. 20 = 100  $\mu\text{m}$ ; Figs. 21 and 22 = 20  $\mu\text{m}$ ; Figs. 23–28 = 5  $\mu\text{m}$ .

In *Yinmingella*, however, they are monoblastic and discrete, and the conidia are amerosporous. There are a few taxa in *Sporidesmium* (sensu Ellis 1958, 1971, 1976) in which conidiophores are absent, and the conidia are typically produced on simple, monoblastic, dematiaceous conidiogenous cells comparable to those in *Yinmingella*. On the basis of this conidiogenous cell morphology, these *Sporidesmium* species (sensu Ellis), for example, *Sporidesmium caespitosum* (Ellis & Everh.) M.B. Ellis, *Sporidesmium hormiscioides* Corda, *Sporidesmium nigroaca* B. Sutton, and *Sporidesmium vermiculatum* (Cooke) M.B. Ellis, were transferred to *Stanjehughesia* Subram. (Subramanian 1992). *Stanjehughesia* species are clearly separated from *Yinmingella* in having phragmospores, as do species of *Janetia* and all other *Sporidesmium* species (sensu lato). All of these hyphomycete genera, in addition to the comparable characters discussed above, also differ from *Yinmingella* in the absence of distinct stromata and in their solitary conidia, no matter whether they produce amerospores or phragmospores.

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