

(Linn.) K. Schum. This taxon differs appreciably from all the *P. substriata* varieties by its longer teliospores which have up to 5 cells, and is therefore described as new.

***Puccinia substriata* Ell. & Barth. var. *decrospora* var. nov.** (Figs 1-4)

Etym. Greek, *decros* = long, *spora* = seed or spore, referring to the long teliospores

Urediniis cinnamomeo-brunneis, amphigenis vel plerumque epiphyllis, linearibus, laxe ellipsoideis vel fere rotundatis, tarde dehiscentibus, sparsis vel laxe aggregatis; urediniosporis flavidis, late ellipsoideis ad obovoideis, $36-40.8 (-43.2) \times 24-26 \mu\text{m}$, membrana echinulata, $2 \mu\text{m}$ crassa, poris germinationis 2, aequatorialibus, pedicello hyalino, cylindraceo, non persistenti, usque $60 \mu\text{m}$ longo. Teliis atratis, linearibus, oblongis and rotundatis, compactis, amphigenis vel plerumque epiphyllis, tarde dehiscentibus, sparsis vel coalescentibus linearibus vel lateribus, usque ad 6 mm longis; teliosporis leniter brunneis, atroinquinans ad apicem, variables, clavatis, oblongis vel oblongo-ellipsoideis, ad 4-cellularibus, raro 5-cellularibus, $(43-)$ $67.2-115 (-122.4) \times 19.2-28.8 (-31.2) \mu\text{m}$, membrana $2.4 \mu\text{m}$ crassa, ad apicem $9.6 \mu\text{m}$ incrassata, pedicello usque $38.4 \mu\text{m}$ longo; mesosporis raro, leniter brunneis, obovoideis, $(28.8-)$ $36-48 \times 19.2-24 \mu\text{m}$, membrana levi, usque ad $2.4 \mu\text{m}$ crassa, ad apicem $7.2 \mu\text{m}$ incrassata.

In foliis *Penniseti americani* (Linn.) K. Schum. Aliade, Benue State, 17 Nov. 1982, Eboh & J. Iredu, Eboh 200, holotypus.

Uredinia cinnamon-brown, amphigenous but mostly epiphyllous, elongate, broadly ellipsoid to nearly globose, tardily exposed, scattered or in small clusters; urediniospores yellowish, broadly ellipsoid to obovoid, $36-40.8 (-43.2) \times 24-26 \mu\text{m}$, wall echinulate, to $2 \mu\text{m}$ thick, germ pores 2,

equatorial, pedicel cylindrical, not persistent, hyaline, to $60 \mu\text{m}$ long. *Telia* black, elongate, oblong to globose, compact, occasionally arising from uredinial sori, amphigenous but mostly epiphyllous, tardily exposed, epidermal flap remaining even after soral rupture, scattered or coalescing linearly or laterally, to 6 mm long; teliospores light brown, darker at the apical region, variable, clavate, oblong-ellipsoid, to 4-celled, occasionally 5-celled, $(43-)$ $67.2-115 (-122.4) \times 19.2-28.8 (-31.2) \mu\text{m}$, wall to $2.4 \mu\text{m}$ thick at the sides, $9.6 \mu\text{m}$ at the apex, pedicel to $38.4 \mu\text{m}$ long; mesosporis occasionally present, light brown, obovoid $(28.8-)$ $36-48 \times 19.2-24 \mu\text{m}$, wall smooth, to $2.4 \mu\text{m}$ thick at the sides, $7.2 \mu\text{m}$ at the apex.

Specimens examined: on *Pennisetum americanum* (Linn.) K. Schum., Aliade, Benue State, 17 Nov. 1982, Eboh & J. Iredu, Eboh 200, holotype; Awaji, Benue State, 22 Oct. 1982, Eboh 201; on *Pennisetum polystachion* (Linn.) Schult., behind Odenigwe quarters, Nsukka, 2 Dec. 1982, Eboh 165.

Puccinia substriata Ell. & Barth. var. *decrospora* is closest to *P. substriata* var. *indica* Ramachar & Cumm. but differs by having larger teliospores which are up to 5-celled. The telia of *P. substriata* var. *indica* are mostly hypophyllous, the teliospores are mostly 2-celled but occasionally 3-celled, $(36-)$ $45-76.8 \times 14.4-24 (-26) \mu\text{m}$, and the urediniospores are smaller than those of *P. substriata* var. *decrospora*.

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NEW SPECIES OF *GELOPELLIS* AND *PROTUBERA* FROM WESTERN AUSTRALIA

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Two new species in the Phallales, *Gelopellis purpurascens* and *Protubera canescens* collected from under eucalypts in the *Eucalyptus marginata* (jarrah) forest of southwestern Australia are described and illustrated.

During investigations in Western Australia by the second author into the mycorrhizal relationships between species of *Eucalyptus* L'Hérit. and associated phalloid fungi, several collections were made

of the two species that were distinctive in that neither produced an expanded receptacle. All collections were initially hypogean and mostly remained so, decaying in situ if undisturbed by

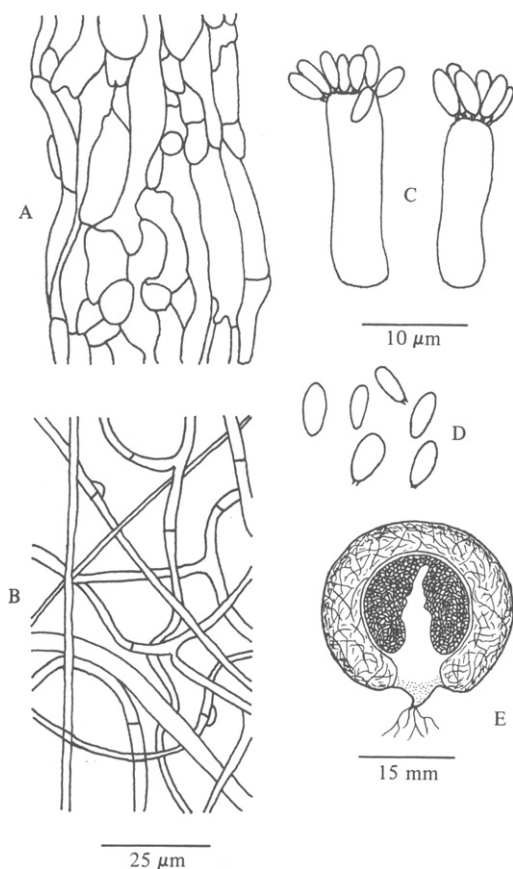


Fig. 1. *Gelopellis purpurascens*. (A) Hyphae of outer layer of peridium; (B) hyphae of inner layer of peridium; (C) six- and eight-spored basidia; (D) spores; (E) longitudinal section of freeze-dried gasterocarp.

animals or birds. The gasterocarps of both species consist of a thin outer peridium, mainly attached by basal rhizomorphs, enclosing a very thick and gelatinous inner peridium surrounding a minutely chambered, partly gelatinized gleba. The gleba in one species is penetrated by a prominent simple or compound columella which, together with the peridial and glebal structure, closely resembles *Gelopellis* Zeller in the monotypic Gellopellidaceae. In the other species the peridium and gleba are structurally similar except for the possession of radial sutures or membranes in the thick, gelatinous peridium; and in the gleba lacking a definite columella but in specimens of some collections being divided into sections. The radial membranes or sutures and the often divided gleba place this species in *Protuberata* A. Möller in the Protophallaceae.

From references, descriptions and illustrations available for species of both genera it appears that specific structural characters or interpretations of them are variable (Dring, 1964; Furtado & Dring, 1967; Homrich, 1969; Murrill, 1910; Zeller, 1939, 1947, 1948; Zeller & Dodge, 1929). This structural variation between specimens of the Western Australian collections is also apparent, particularly in *Protuberata*, but the microscopical characters of both species are very consistent for the respective genera.

Examination of the type collections of the various species of the two genera has not been possible. Comparison of the Western Australian collections with the published descriptions of the species of each genus excludes these collections from the published ones on grounds of peridial or glebal colour, basidial size and number of spores per basidium or spore colour, size or length/breadth ratio. Therefore we describe the Western Australian species with a purple-staining, outer peridial layer and a definite columella as *Gelopellis purpurascens* and the species with a white peridium drying orange-white, with radial sutures in the thick, gelatinous peridium and no definite columella as *Protuberata canescens*.

All colour references are from Kornerup & Wanscher (1967) and are converted to Munsell notation.

Gelopellis purpurascens sp. nov. (Fig. 1)

Gasterocarpus hypogaeus, ad basim depressus, sessilis, ad 25 mm diam, indehiscens, albus, contusum subroseo-purpureum, gelatum exsiccatum griseo-brunneum vel roseum; peridium bistratum, stratum exterius ad 150 μm crassum, hyphae tenuitunicatae, cellulae inflatae et gelatinosae presentes, stratum interius ad 6 mm crassum, hyphae intertextae, fibulae, ad 6 mm crassum, hyphae intertextae, fibulae, ad 6 μm crassae immersae matrix gelatinosa; gleba ad 14 mm diam, globosa vel ellipsoidea, minute loculosa, griseo-aurantica, columella alba, simplex vel percurrans, columella ad 5 mm diam basaliter et basis sterilis columella continua, stratum ad 350 μm crassum contextus gleba cingens, hyphae omnes intertextae, structurae variabiles, cellulae inflatae ad 15 μm diam presentes, immersae matrix gelatinosa; laminae tramae ad 125 μm crassae, trama hymenophoralis gelatinosa, hyphae parallelae ad 7 μm crassae, subhymenium debiliter evoluta; basidia cylindrica, 6–8 spori, 16–18 × 4.0–5.0 μm; spores ellipsoideae, laeves, 3.5–5.0 × 2.0–2.5 μm, brevipedicellatae vel sine pedicellae.

Gasterocarps hypogaeal, usually in small clusters, attached by basal rhizomorphs from a well-defined depressed area, globose or subglobose, to 25 mm diam, indehiscent, white staining pinkish-purple when bruised, greyish-brown to Rosewood (4.5R/4.8/4.5) when freeze-dried, shrinking greatly when dried naturally; *peridium* of two layers, the

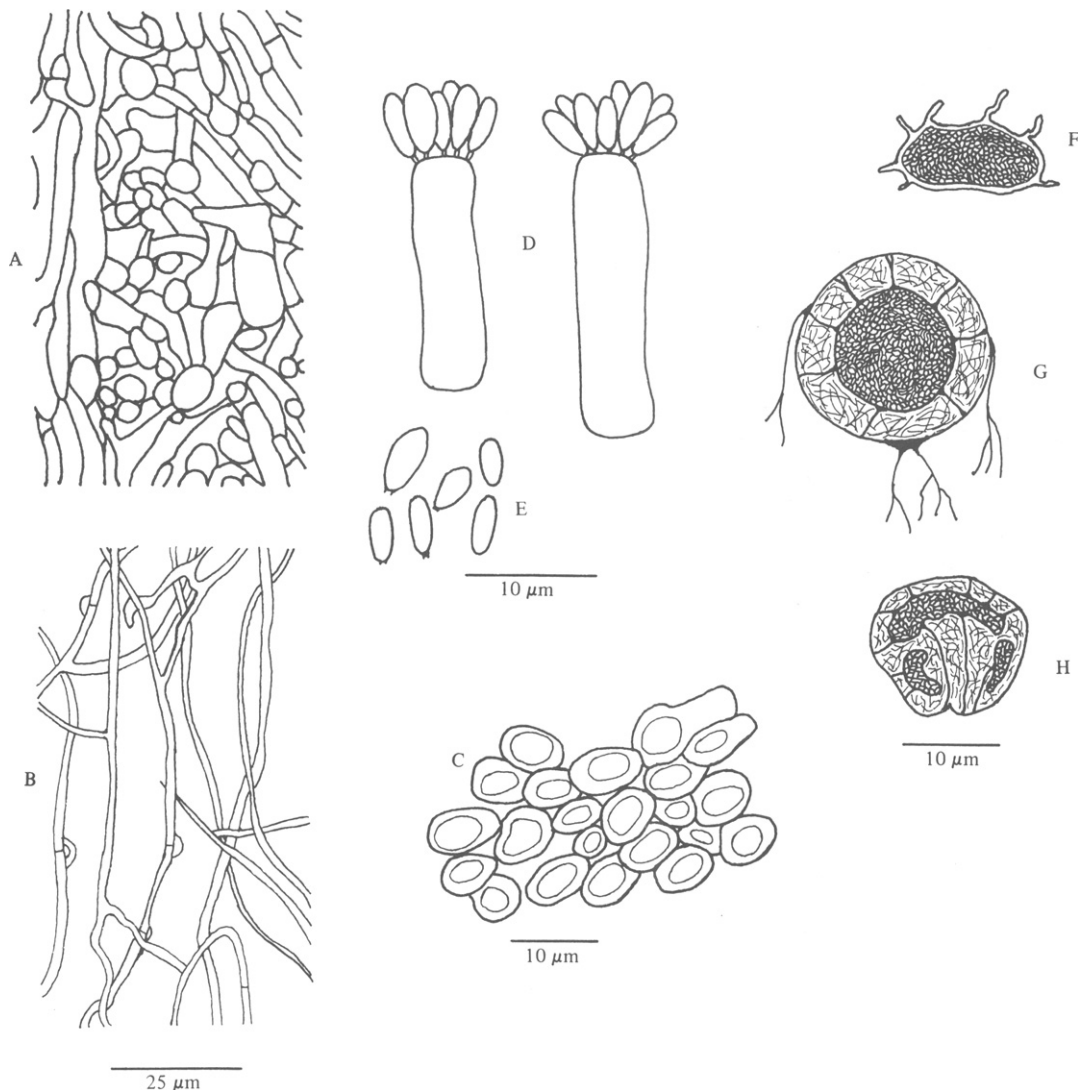


Fig. 2. *Protuberera canescens*. (A) Hyphae of outer layer of peridium; (B) hyphae of inner layer of peridium; (C) tissue of thick-walled cells from radial membrane; (D) six- and eight-spore basidia; (E) spores; (F) longitudinal section of naturally dried gasterocarp with ribs formed by gelatinous tissue contracting around radial membranes; (G) longitudinal section of freeze-dried gasterocarp with continuous gleba and radial membranes; (H) longitudinal section of freeze-dried gasterocarp with interrupted gleba.

outer to $150\ \mu\text{m}$ thick, of tightly interwoven, thin-walled, irregular hyphae with inflated elements, the inner layer to $6\ \text{mm}$ thick, of very loosely interwoven, clamped hyphae to $6\ \mu\text{m}$ diam in a gelatinous matrix that is liquid when fresh; gleba to $14\ \mu\text{m}$ diam, globose to ellipsoidal, grey-orange (7YR/7-8/2-8), elastic when fresh, of minute, irregularly shaped, empty or partially

filled chambers and penetrated by a white, simple or percurrent, tapering columella to $5\ \text{mm}$ diam arising from a variable sterile base, both sharply delimited from the gelatinous layer of the peridium and continuous with a distinctive layer to $350\ \mu\text{m}$ thick surrounding the glebal tissue, the three mainly composed of interwoven, thin-walled, variably thick hyphae with inflated elements to

15 μm diam in a scanty gelatinous matrix; *tramal plates* to 125 μm thick, hymenophoral trama gelatinous, of parallel, thin-walled hyphae to 7 μm diam, subhymenial layer poorly developed; basidia cylindrical, 16–18 \times 4.0–5.0 μm , with 6–8 spores on short, cylindrical sterigmata; *spores* ellipsoidal or slightly tapering basally, lightly tinted in mass, hyaline by transmitted light, smooth, 3.5–5.0 \times 2.0–2.5 μm , pedicellate or not.

Specimens examined: Western Australia, Jarrahdale bauxite mine site, under *Eucalyptus marginata* Donn ex Sm., 13 Sept. 1982, N. Malajczuk & J. Trappe in Malajczuk H292, Holotype, MELU; Dell Park bauxite mine site, under *Eucalyptus calophylla* R. Br., 18 Sept. 1981, N. Malajczuk H216.

Dring (1973) stated of the Gelopellidaceae 'A single genus *Gelopellis* with about 5 species'. We have only been able to locate three published species: *G. macrospora* Zeller, *G. thaxteri* (Zeller & Dodge) Zeller and *G. hahashimensis* (S. Ito & S. Imai) Zeller. *G. macrospora* differs from *G. purpurascens* in its much larger spores, *G. hahashimensis* differs at least in having a suspended columella as indicated by Zeller (1947) and *G. thaxteri*, apparently the closest species to *G. purpurascens*, differs in the colour of the outer peridium and gleba, in the lighter-coloured and larger spores and in the absence from the columella of the inflated, isodiametric cells described and illustrated by Homrich (1969).

***Protuberata canescens* sp. nov.** (Fig. 2)

Gasterocarpi hypogaei, ad 20 mm diam, subglobosi vel contorti, ad bases affixi per rhizomorphae albi, initio albi vel creme, in sicco ex aurantiaco-albi, laeves, indehiscentes; peridium tristratum, stratum exterius ad 150 μm crassum, hyphae tenuitunicatae arcte intertextae, cellulae inflatae presentes, stratum medium ad 4 mm crassum *gasterocarpi* symmetrici, hyphae fibulae, laxae intertextae ad 3 μm crassae, matrix gelatinosa et suturae radiales, stratum interius ad 75 μm crassum, gleba singens; gleba ad 10 mm diam, globosa vel irregularis, pallide olivaceo-brunnea, elastica, ex loculi parvi, irregulari composita, cassi vel partim impleti; laminae tramae 100–200 μm crassae, trama hymenophoralis gelatinosa, ex hyphae parallelae vel subparallelae ad 8 μm diam composita; subhymenium debiliter evoluta; basidia cylindrica, 18–22 \times 5.0–6.0 μm , 6–8 spori, sterigmata brevia, cylindrica; spora ellipsoideae vel angustatae ad bases, laeves, hyalinae, 4.0–5.5 \times 2.0–2.5 μm .

Gasterocarps hypogaeal, usually in clusters, basally attached by white rhizomorphs, a few with lateral rhizomorphs also, to 20 mm diam, globose to subglobose, white to creamy white and smooth or slightly mealy apically when fresh, pale orange-white (7YR/8.9/1.8) when freeze-dried, shrinking greatly with protruding ribs to 5 mm high when dried naturally, indehiscent; *peridium* of three

layers: the outer layer to 150 μm thick, of hyaline, thin-walled, tightly interwoven, irregular hyphae with inflated elements and some gelatinous content merging gradually with the middle layer, to 4 mm thick on symmetrical specimens, of very loosely interwoven hyphae to 3 μm diam, with large clamps, in a liquid gelatinous matrix and penetrated by a variable number of radial membranes or sutures which in places divide longitudinally, are of similar but denser structure to the middle layer and develop areas of thick-walled cells 5–10 μm diam mostly along the lines of division of the sutures; the inner layer of the peridium surrounds the gleba, is up to 75 μm thick and is continuous with and of similar structure to the sutures; *gleba* to 10 mm diam, globose to very irregularly shaped, light olive-brown (4.5Y/5.9/1.6), partly gelatinized, continuous or divided into segments by inclusions of tissue of the central peridial layer, of small empty to partly filled chambers 3–6 per mm, with no definite arrangement, no definite columella present but intrusions of peridial tissue may have a columella-like appearance; *tramal plates* 100–200 μm thick, hymenophoral trama gelatinized, of subparallel to lightly interwoven hyphae to 8 μm diam, subhymenial layers poorly developed; *basidia* cylindrical 18–22 \times 5–6 μm , 6- to 8-spored, sterigmata short, cylindrical; *spores* ellipsoidal or slightly tapering basally, smooth, lightly tinted, hyaline by transmitted light, 4.0–5.5 \times 2.0–2.5 μm , briefly or not pedicellate.

Specimens examined: Western Australia: Ludlow State Forest nr Busselton under *Eucalyptus gomphocephala* A. DC., 14 July 1980, N. Malajczuk H67, holotype, MELU; under *Eucalyptus marginata* Donn ex Sm., Jarrahdale bauxite mine site nr Jarrahdale, 6 June 1983, N. Malajczuk H343; Bibra Lake, Perth, under *Eucalyptus marginata* Donn ex Sm., 13 July 1980 (L. Sanfelieu), N. Malajczuk H67C; Cobiac Forest block, Jarrahdale, 22 July 1983, N. Malajczuk H356; Dickson rd nr Manjimup, 16 July 1980, N. Malajczuk H69; Jarrahdale forest nr Nannup, Oct. 1979, N. Malajczuk H21; Jarrahdale bauxite mine site nr Jarrahdale under *Eucalyptus microcorys* F. v. M., 19 July 1984, N. Malajczuk H409; Cobiac forest Block, Jarrahdale, under *Eucalyptus marginata* Donn ex Sm., 31 July 1980, N. Malajczuk H73A.

P. canescens differs in range of spore size or in length/breadth ratio from all species of *Protuberata* of which descriptions are known. The nearest is *P. maracuja*, but this has smaller, 4-spored basidia and a gleba of 'numerous small seed-like masses sunken into a gelatinous matrix' (Furtado & Dring, 1967), which would definitely exclude it from that species.

The precise distribution of the areas of thick-walled cells in the sutures and in the inner layer of the peridium of *P. canescens* is difficult to

determine, as also is their function. These areas appear to be associated with the longitudinal splitting of the sutures and the separation of the inner peridial layer from the glebal tissue, as they appear mostly on these surfaces of separation. It may be suggested that what we have termed the inner peridial layer would be more appropriately associated with the glebal structure. However, this is not so, as the more densely interwoven tissue of the sutures is derived directly from the loosely interwoven middle peridial layer hyphae. In addition, the thick-walled cells develop within this tissue and are always continuous with it, at least in the areas away from the lines of longitudinal division of the sutures and in the areas of separation of the inner peridium from the gleba.

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CIVISUBRAMANIANIA EUCALYPTI GEN. ET SP. NOV.

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Civisubramaniana is described and illustrated as a new genus of hyphomycetes with the type and only species, *C. eucalypti*. The genus is compared and contrasted with *Sarcopodium*, *Conoplea* and *Kumanasamuha*.

During a taxonomic investigation of the microfungi associated with leaf litter of several *Eucalyptus* species in South India, an interesting hyphomycete was collected several times which to our knowledge has not been previously reported either from *Eucalyptus* or any other substrate. This interesting fungus is dedicated to Professor C. V. Subramanian, who has made significant contributions to our knowledge of Hyphomycetes; it is named *Civisubramaniana*.

Civisubramaniana gen. nov.

Coloniae pulvinatae, constitutae e conidiophori macronematosis, ramosis, verrucosis, prope undulatis, compacte conjunctis ad basim, intermixtus helcium sterilium brunneis hyphis. Cellulae conidiogenae discretae, conferatae in apice conidiophorum; cellulae conidiogenosae fertiles ampulliformes cum collis longis, gerentes conidia in cacumine ab pleures diversus loci. Conidia

holoblastica, solitaria, arida, hyalina, ellipsiformia vel sub-globosa, echinulata.

Sp. typ.: *C. eucalypti*.

Colonies pulvinate, consisting of numerous macronematous, branched, verrucose, closely undulating conidiophores compact at base, intermixed with helically twisted brown sterile hyphae. Conidiogenous cells discrete, clustered at the tips of conidiophores; fertile conidiogenous cells flask-shaped with long necks bearing conidia from several different loci at the tip. Conidia holoblastic, solitary, dry, hyaline, ellipsoidal to subspherical, echinulate.

Among several hyphomycetes described in the literature *Civisubramaniana* bears some resemblance to three genera, namely *Sarcopodium* Ehrenb. (Sutton, 1981), *Conoplea* Pers. (Hughes, 1960) and *Kumanasamuha* Rao & Rao (1964). The