

PODOSPORA DIMORPHA (LASIOSPHAERIACEAE), A NEW SPECIES FROM AUSTRALIA

A. Bell

45, Gurney Road, Lower Hutt, New Zealand.

Abstract

Podospora dimorpha, a new species is described from macropod dung collected in the Northern Territory of Australia. The most distinctive feature of this species is the presence of two very different types of ascospore.

Key words: New species, *Lasiosphaeriaceae*, coprophilous fungi, systematics, Australia.

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Introduction

During routine observation of macropod dung collected in the Northern Territory of Australia, a new species of *Podospora* was encountered.

Materials and Methods

A dried sample of macropod dung collected in Elsey National Park in the Northern Territory of Australia by Pat Grey in July 2000, was forwarded to me in New Zealand, where it was placed in its dried state in a refrigerator at approximately 2°C until October 2003, when it was soaked in sterile distilled water and incubated on moist filter paper in a glass (lidded) container (Bell 1999). The fungus was very slow to appear, and was not mature until March 2004, after some 5–6 months of incubation. Initial microscopic observations were made in water mounts. A number of semi-permanent slides were made using Shear's mounting medium (Bell 1999). The ascospore size range was determined by measuring 50 of the dark pedicellate ascospores and 30 of the hyaline dictyosporous ascospores. A portion of the dung bearing the specimen was air dried for incorporation into the herbarium at Landcare (PDD) in Auckland.

In addition, mature perithecia were surface sterilized in a 3% solution of hydrogen peroxide for 10 minutes, after which they were squashed and their contents spread on to the surface of weak potato carrot agar (PCA). The hyaline dictyosporous ascospores germinated readily after approx. 18 hours at 25°C. Portions of the mycelium were transferred to PCA slopes and forwarded to the culture collection at the Centraalbureau voor Schimmelcultures (CBS), Utrecht, the Netherlands. Reference to colour in the following description follows the notation of Kornerup & Wanscher (1978).

Taxonomy

Podospora dimorpha A. Bell sp. nov. (Figures 1 & 2)

Etymology: *di* = 'two'; *morph* = 'form', referring to the two forms of the ascospores.

Perithecia aggregata, ventre subterraneo, globosa, 0.5 mm diam., peridium textura angularis. Collo emergente, superficie velutina. Asci cylindranei, annulo apicali non manifest, 8-sporei. Ascosporeae biseriatae, dimorphae: Ascosporeae 1): cellula superiore brunnea, glabro tunicata, ellipsoideae, asymmetricae vel symmetricae, basi truncatae, poro germinali apicali, magnitudine variables, 21–30 (–32) × 15–20 µm. Pedicellus hyalinus, cylindranei, rectus vel curvatus, 21 × 10 µm, evanescens. Cauda gelatinosa attenuata in extremis ascosporeae

affixa. Cauda superior canaliculatas. Ascosporae 2): hyalinus, clavatus, dictyosporus, $33-45 (-50) \times 10-15 \mu\text{m}$. Fimicola.

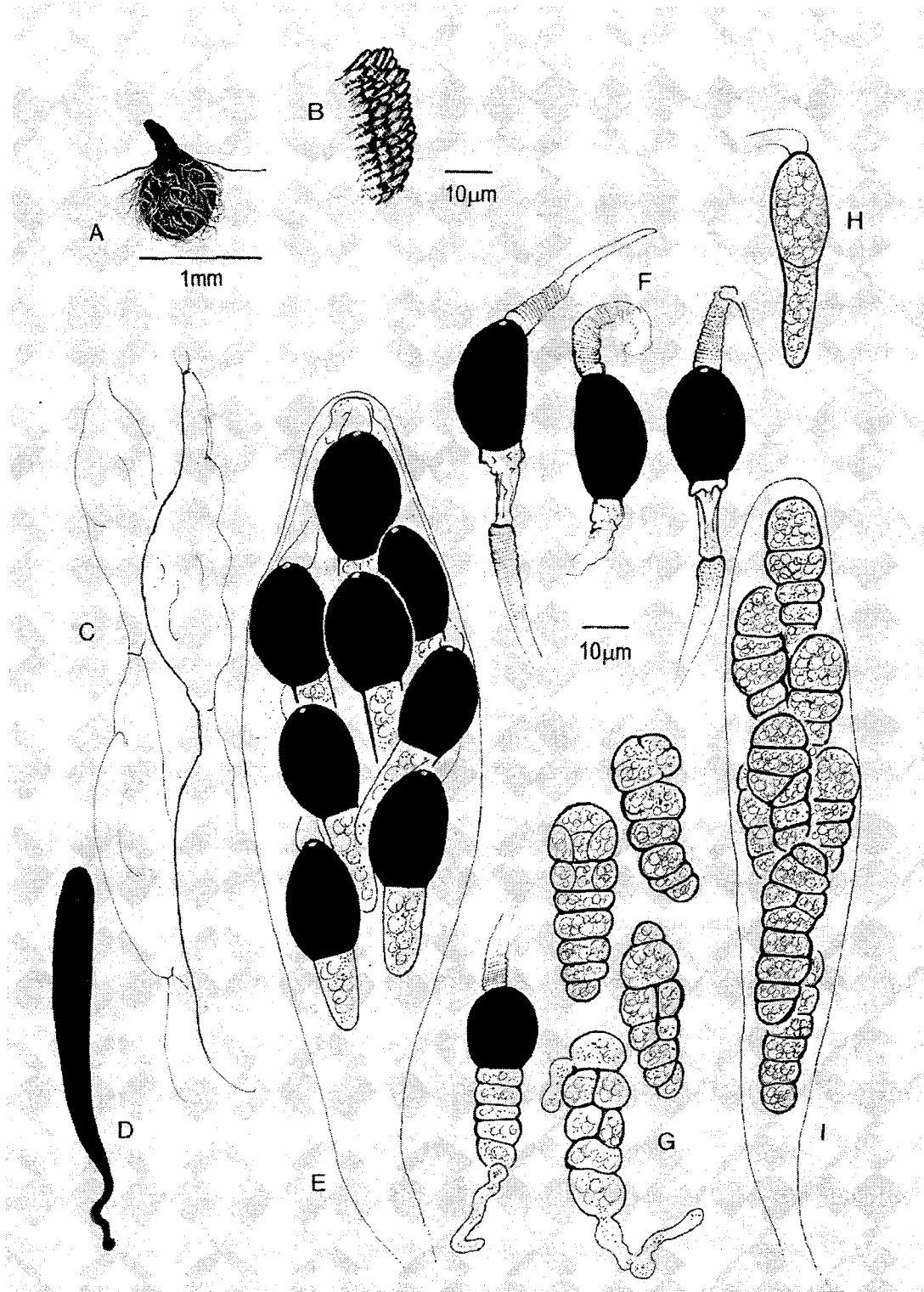


Figure 1. *Podospora dimorpha*. A—mature perithecium, B—details of neck cells, C—interascal tissue, D—silhouette of mature ascus, E—mature ascospores within ascus, F—mature ascospores more typical of *Podospora* species, G—mature hyaline dictyosporous ascospores and one spore which is a mix of the two spore types, H—immature ascospore, I—ascus containing hyaline dictyosporous ascospores.

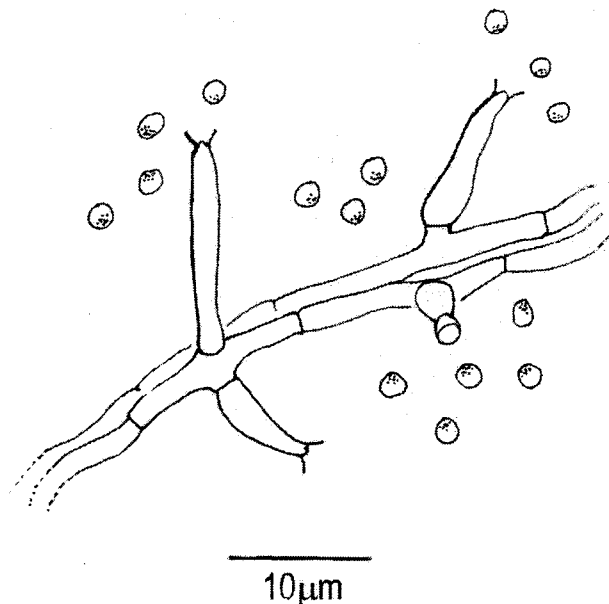


Figure 2. *Phialophora* anamorph of *Podospora dimorpha*.

distinct morphologies, although during their early stages of development, they are all hyaline and clavate (Fig. 1H). Most young ascospores proceed to develop bicoloured two-celled ascospores typical of the genus. These are as follows: Dark cell smooth, ellipsoidal, symmetrical to slightly asymmetrical about the long axis, rounded at the apex and truncate at the base, $21\text{--}30$ (~ 32) \times $15\text{--}20$ μm , often quite variable even within the same ascus, each with a small apical germ pore. Hyaline pedicel cylindrical with broad attachment to dark cell, straight or slightly curved, approximately 21×10 μm , short-lived, mostly seen in its collapsed state (Fig. 1F). Caudae lash-like, one at each end of ascospore, persistent, appearing horizontally wrinkled, upper one sometimes with a single channel (Fig. 1E & F). Within any one perithecium, most mature ascospores are of this morphology. However, a number of mature asci contain mature ascospores that remain hyaline and become dictyosporous. This spore form is clavate, $33\text{--}45$ (~ 50) \times $10\text{--}15$ μm , with a variable number of transverse septa (usually 4–6), and a few vertical or oblique septa (1–5) (Fig. 1G & I). At first it was thought that these latter ascospores were abnormal, resulting from the age of the specimen or perhaps the length of time of the incubation period. However, it became clear that they represented up to 25% of the ascospores in every perithecium investigated. Some asci contained ascospores of both types; others contained ascospores whose morphology was a mix of both spore types having a dark cell with a septate pedicel (Fig. 1G).

Holotype: On macropod dung amongst subtropical vegetation (including *Pandanus spiralis* and *Livistonia rigida*) at Elsey National Park, E of Mataranka, Northern Territory, Australia, lat. $14^{\circ}49'S$, long. $133^{\circ}10'E$, collected in July 2000, by Pat Grey (PDD 80310).

Characteristics in culture: Only the hyaline dictyosporous germinated (Fig. 1G). Colony growth resultant from several germinating ascospores reached approximately 3–4 cm diam. in four weeks on weak potato carrot agar (PCA), which is a reasonably fast growth rate for a coprophilous species. Submerged mycelium dark greenish grey (25F3), older aerial mycelium floccose, grey (25E1), covered with an abundant *Phialophora* anamorph (Fig. 2). To date, no teleomorph has formed in culture. Culture deposited at Centraalbureau voor Schimmelcultures (CBS 115806).

Discussion

The most distinctive feature of this species of *Podospora* is the two distinct types of ascospores. The bicoloured, more typical *Podospora* ascospore, somewhat resembles ascospores of *P. dasypogon* N. Lundq. and *P. pyriformis* (Bayer) Cain (Lundqvist, 1972). However, the perithecia of *P. dasypogon* are profusely covered with dark bristles and the caudae are quite different. *Podospora pyriformis* has a glabrous perithecial neck, but

Characteristics on dung: *Perithecia* aggregated but not confluent, venters submerged beneath dung surface, necks emergent and directed towards the light source. Venters sphaeroidal, black, approximately 0.5 mm in diameter, consisting of angular pseudoparenchyma (*textura angularis*), and covered in brown, septate, branched hairs. Necks slender, black, smooth, approximately 0.5 mm high, outer cells of which form a velvety texture (Fig. 1A & B). *Centrum* contents (Fig. 1C) surrounded by columns of inflated cells that diminish in size towards the ostiole, similar to those described for *Podospora tetraspora* (Bell & Mahoney 1996). Ripe asci cylindrical/clavate, long-stalked, swelling in water, 8-spored. No ring observed at the ascus tip. *Ascospores* irregularly biserial, becoming somewhat multiserial when ascus swells in water (Fig. 1E & I). Mature ascospores of two very

the ascospores are much larger. Both *P. pyriformis* and *P. dasypogon* require a long incubation time in which to develop (3–4 weeks). Interestingly, Lundqvist (1972) reported hyaline septate ascospores as occurring in both these species, although he stated that the occurrence was 'anomalous and rare' (for *P. dasypogon*) and 'atypical' (for *P. pyriformis*). It is tempting to postulate that the easily germinating hyaline dictyospores have a survival value for *P. dimorpha*, allowing the fungus to be capable of speedy germination, while the dark cell of the two-celled ascospores have the function of being resistant to desiccation and thereby allowing the species to survive prolonged drought. However, if this were so, one would expect that similarly dimorphic ascospores would be common among coprophilous fungi, dung being such an itinerant substrate. The fully mature ascospores of *Podospora* species are usually difficult to germinate, and the pedicel usually does not play any part in germination (Bell & Mahoney 1995). The pedicel of the typical two-celled ascospore of *P. dimorpha* is very short-lived, while the caudae are persistent even in semi-permanent mounting media, which is also an unusual feature for this genus. The more usual situation is that the caudae are evanescent.

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