

## Fungi from palms. XXVIII\*. Two new species of *Pemphidium* from Australia and Indonesia

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The genus *Pemphidium*, known only from the neotropics, is reported from Australia and Indonesia for the first time. *Pemphidium calamicola* sp. nov. from *Calamus* “rattan” in north Queensland and *P. palmicola* from an unidentified palm rachis in Java are described and illustrated. They are compared with existing species and their relationship to other genera is discussed.

Keywords: ascomycetes, *Linocarpon*, palm fungi, *Pemphidium*.

Hyde (1993) reviewed the genus *Pemphidium* Mont., accepting the type species *P. nitidum* Mont. and adding a further species, *P. zonatum* K. D. Hyde. In both species the ascomata form under blackened pseudostroma, paraphyses are hypha-like and embedded in a gelatinous matrix and asci are long cylindrical with a non-amyloid subapical ring. Ascospores are distinct in that they are cylindrical to fusiform, mostly unicellular and provided with characteristic appendages at each end. These comprise a hollow cylinder containing mucilage. The genus was only known from South America. All other names in *Pemphidium* names were excluded.

*Pemphidium* was compared with *Oxydothis* Syd. & P. Syd. and *Linocarpon* Syd. & P. Syd. It is probably most easily confused with the latter, but differs in the nature of the paraphyses, which are not embedded in a gelatinous matrix in *Linocarpon* (Hyde, 1992). The asci are also provided with a refractive apical ring as compared to non-refractive subapical ring in *Pemphidium*. During studies of palm fungi in Cibodas, Java, a species characteristic of *Pemphidium*, but with very long ascospores was collected. A second species with unicellular filiform ascospores provided with polar cup-like appendages and asci similar to those found in *Pemphidium* was also collected on *Calamus* „rattan“ in north Queensland, Australia. The pseudostromata in this species are unusual for *Pemphidium*, comprising large irregular spots incorporating several sunken oval regions, beneath which the ascomata develop. These fungi are

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considered to belong in *Pemphidium* and are described and illustrated in this paper. A synopsis of *Pemphidium* species is provided in Tab. 1.

### Key to *Pemphidium* species

1. Ascospores shorter than 100  $\mu\text{m}$  ..... 2
1. Ascospores longer than 100  $\mu\text{m}$  ..... 3
2. Ascomata developing within darkened pseudostroma, lacking distinct outer margins, spores 47–69  $\times$  4–6.5  $\mu\text{m}$  ..... *P. nitidum*
2. Ascomata developing within a darkened pseudostroma, with a distinct outer margin, spores 60–94  $\times$  3.5–4.5  $\mu\text{m}$  ..... *P. zonatum*
3. Ascomata under pseudostroma comprising blackened sunken oval regions in grey irregular spots, spores 117–130  $\times$  5–6.5  $\mu\text{m}$  ..... *P. calamicola*
3. Ascomata under individual pseudostromata, spores 128–168  $\times$  3–4.5  $\mu\text{m}$  ..... *P. palmicola*

Tab. 1. – Synopsis of *Pemphidium* species.

	<i>P. calamicola</i>	<i>P. nitidum</i>	<i>P. palmicola</i>	<i>P. zonatum</i>
Pseudostroma	Grey areas 15 mm long, 10 mm wide, with inner blackened sunken oval regions with immersed ascomata	5.5 cm long, 2 cm wide, covering numerous ascomata	2 mm diam., mostly with single ascoma, some coalescing	9 mm long, 5 mm wide zonate pseudostroma covering numerous or single ascomata
Ascomata	ca 2 mm long, 1 mm wide, 120 $\mu\text{m}$ high, lenticular or cylindrical	880 $\mu\text{m}$ diam., 120 $\mu\text{m}$ high, cylindrical	780–1050 $\mu\text{m}$ diam., 100–165 $\mu\text{m}$ high, lenticular	900 $\mu\text{m}$ diam., 160 $\mu\text{m}$ high, lenticular
Paraphyses	Hypa-like, very long, numerous, 4.5 $\mu\text{m}$ wide at base no gelatinous matrix	Hypa-like, numerous, embedded in a gelatinous matrix	Hypa-like, very long, sparse, 10 $\mu\text{m}$ wide at base, no gelatinous matrix	Hypa-like, numerous, 2 $\mu\text{m}$ wide at the base, embedded in a gelatinous matrix
Asci	240–360 $\times$ 10–13 $\mu\text{m}$ , cylindrical	195–270 $\times$ 8–10 $\mu\text{m}$ , long-cylindrical	232–320 $\times$ 10–14 $\mu\text{m}$ , cylindrical	210–260 $\times$ 8–12 $\mu\text{m}$ , long-cylindrical
Ascospores	117–130 $\times$ 5–6.5 $\mu\text{m}$ , one-celled, filiform, with cup-like polar appendages	47–69 $\times$ 4–6.5 $\mu\text{m}$ , one-celled, filiform, with hollow polar cylinders with mucilage	128–168 $\times$ 3–4.5 $\mu\text{m}$ , one-celled, filiform, with cup-like polar appendages	60–94 $\times$ 3.5–4.5 $\mu\text{m}$ , one-celled, filiform, with hollow polar cylinders with mucilage

## Taxonomy

### *Pemphidium calamicola* K. D. Hyde, sp. nov. – Figs 1–18.

A specie typica huius generis, *Pemphidium nitidum* Mont. pseudostromatibus depressis super ascomatibus et ascosporis 117–130 x 5–6.4 µm magnis differt.

**E t y m o l o g y.** – In reference to the host *Calamus* sp.

**A s c o m a t a** on 'rattan stems' of *Calamus*, developing beneath grey irregular raised regions, up to 15 mm long, 10 mm wide, incorporating several blackened, oval, sunken areas, up to 3 mm long, 1.5 mm wide, with a central light-coloured ostium (Fig. 1). – **A s c o m a t a** developing beneath the sunken regions, circular to ovoid from above; in section up to 2 mm long, 1 mm wide, 120 µm high, lenticular to cylindrical (Fig. 6). – **P s e u d o s t r o m a** comprising a dark thickened ectostroma and a thinner endostroma deep in the tissue (Fig. 2). – **P e r i d i u m** comprising several layers of light brown-walled compressed cells (Figs. 7–9), brown thin-walled palisade-like cells occur at the periphery of the ascoma (Figs. 7–9). – **P a r a p h y s e s** up to 4.5 µm diam., numerous, hypha-like, filamentous, very long, septate. – **A s c i** 240–360 x 10–13 µm, 8-spored, cylindrical, unitunicate, long pedicellate, apically rounded, with a subapical ring, 3–3.5 µm diam., 1–1.5 µm high (Figs. 15–17). – **A s c o s p o r e s** 117–130 x 5–6.5 µm, filiform, unicellular, hyaline, apically rounded with small appendages at each end, comprising a short cup-like structure containing mucilage (Figs. 10–14, 18).

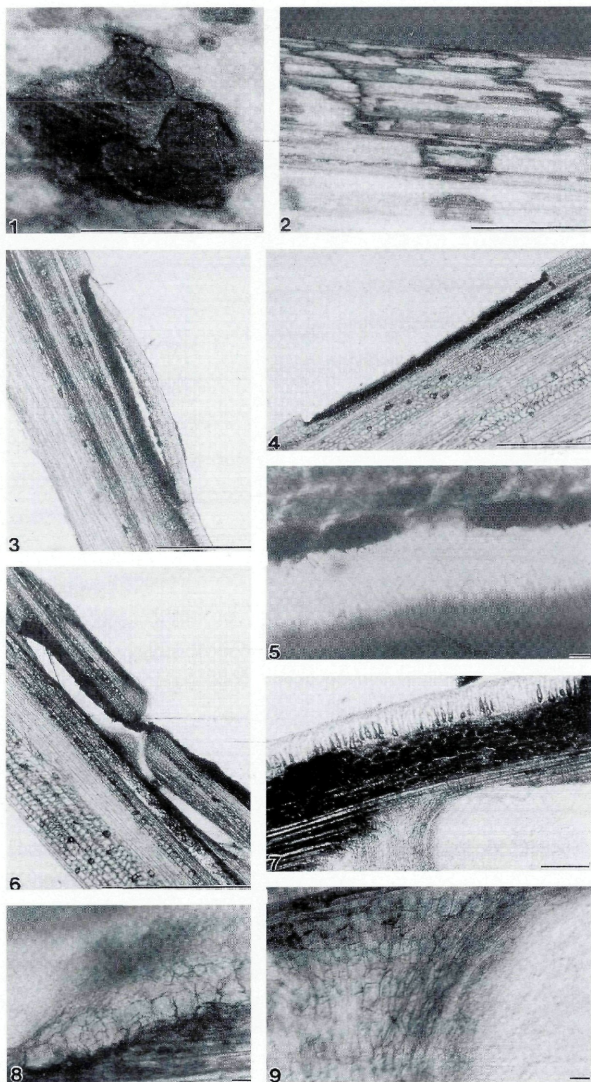
**K n o w n d i s t r i b u t i o n.** – Australia (north Queensland).

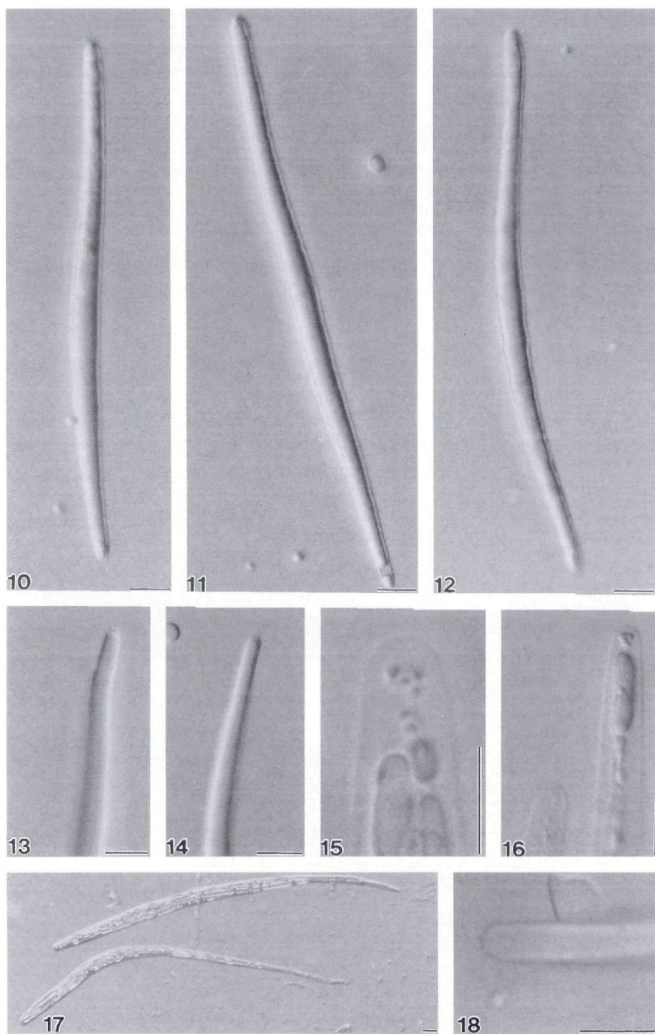
**K n o w n h o s t.** – *Calamus*.

**M a t e r i a l e x a m i n e d.** – AUSTRALIA: north Queensland, Cairns, Freshwater Creek State Forest, on rattan of *Calamus* sp., Feb. 1992, K. D. Hyde 1077; BRIP 23005 (holotype).

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Figs. 1–9. – *Pemphidium calamicola*. – 1. Sunken oval areas under which ascomata develop. – 2. Section through palm tissue illustrating ectostroma and endostroma. – 3–5. Section through young material with possible anamorph. The immersed conidioma (3) raises a disc of cuticular and epidermal cells, which are later sloughed off exposing the fertile anamorph (4). The conidiophores are filiform with terminal phialides, producing bacilliform conidia (5). – 6. Section of immersed ascoma beneath sunken oval area. – 7. Pseudostroma and part of immersed ascoma. – 8, 9. Peridium and peripheral palisade-like cells. – Bars: 1, 2 = 10 mm, 3–5 = 1 mm, 6, 7 = 100 µm, 8, 9 = 10 µm.

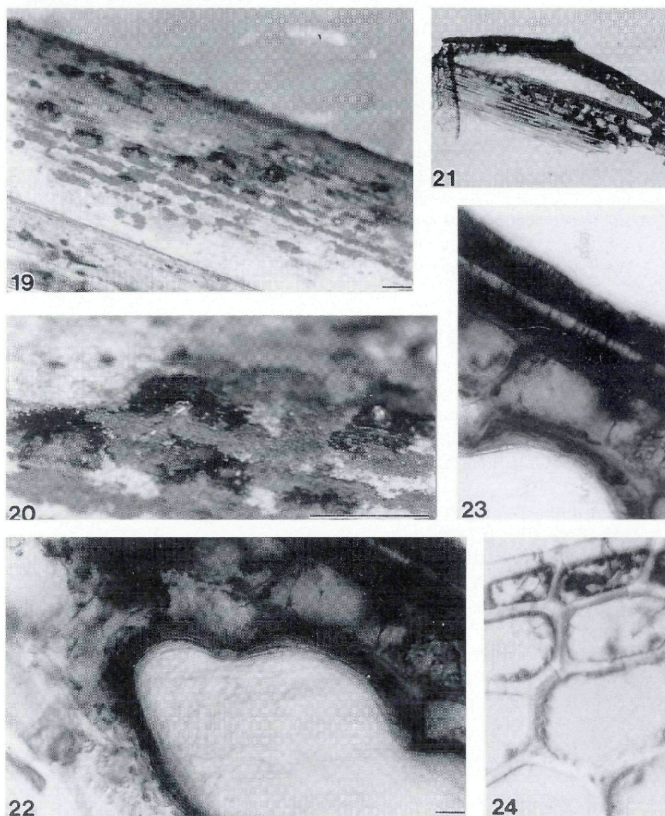




Figs. 10–18. – *Pemphidium calamicola*. – 10–14, 18. Ascospores with polar cup-like appendages. – 15–17. Asci. Note the subapical ring. – Bars = 10  $\mu$ m.



This species is rather uncharacteristic of *Pemphidium*. The pseudostroma incorporating several sunken oval regions, the asci which are very long, and the paraphyses which are very long and numerous are unlike other species of *Pemphidium*. The ascospores, however, are provided with polar cup-like mucilaginous appendages, similar to those in *P. nitidum* and the endostroma is characteristic of *P. zonatum* (Hyde, 1993). Because of these similarities the species is described in *Pemphidium*.



Figs. 19–24. – *Pemphidium palmicola*. – 19, 20. Appearance of ascomata on host surface. – 21. Section of ascoma. – 22, 23. Peridium. – 24. Pseudostroma. – Bars: 19, 20 = 1 mm, 21 = 100  $\mu$ m, 22–24 = 10  $\mu$ m.

In one section through young material (Figs. 3, 5) what appeared to be the anamorph was found. The immersed conidiomata (Fig. 3) raised a disc of cuticular and epidermal cells, which were later sloughed off exposing the fertile anamorph (Fig. 4). The conidiophores were filiform with terminal phialides, producing bacilliform conidia (Fig. 5). Because of the thickness of the section it was not possible to obtain further details of the anamorph and despite numerous attempts it was not possible to confirm this occurrence. It appears that the exposed sunken regions in the pseudostroma result from the sloughing off of the "lid" of the conidiomata and then the ascomata develop beneath these regions. It was, however, not possible to find any conidia or conidiophores in scrapings taken from the surface of these sunken regions. This may have been because of the stage of development of the fungus and this observation must remain tentative until fresh material is collected.

***Pemphidium palmicola* K. D. Hyde, sp. nov. – Figs. 19–35.**

A specie typica huius generis, *Pemphidium nitidum* Mont. ascosporis 128–168 x 3–4.5 µm magnis differt.

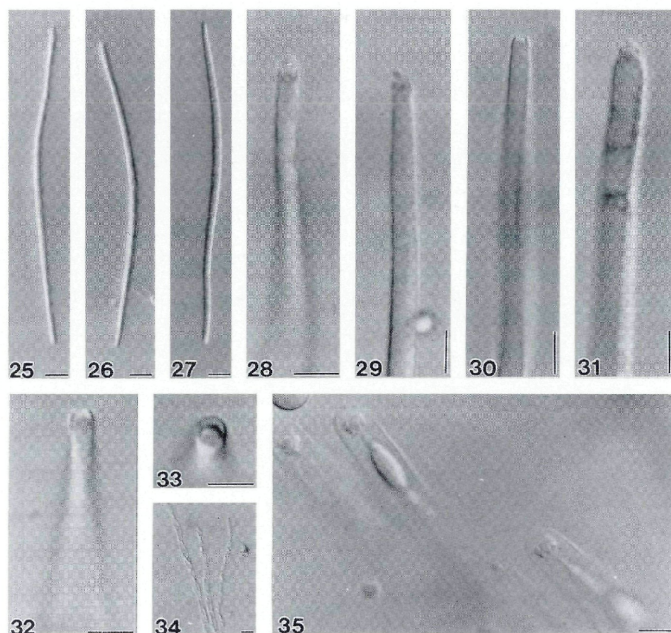
**E t y m o l o g y .** – From *palmicola* meaning 'dwelling on palms'.

**A s c o m a t a** developing beneath slightly raised, black, shiny, oval regions, up to 2 mm diam., solitary or some coalescing, with a central erumpent papilla (Figs. 19, 20); in vertical section 780–1050 µm diam., 100–165 µm high, lenticular, immersed beneath a clypeus, and surrounded by variable stromatal tissue (Fig. 21, 23, 24). – **P e r i d i u m** 10–14 µm thick, comprising 4–7 rows of elongate cells, hyaline inwardly, brown outwardly (Figs. 22, 23). – **P a r a p h y s e s** up to 10 µm wide at the base, sparse, hypha-like, filamentous, septate, hyaline (Fig. 34). – **A s c i** 232–320 x 10–14 µm, 8-spored, cylindrical, long pedicellate, thin-walled, unitunicate, apically rounded, with a J-, subapical ring, 3 µm diam, 1.5–2 µm high (Fig. 35). – **A s c o s p o r e s** 128–168 x 3–4.5 µm, spirally multiseriate, filiform, unicellular, hyaline, with polar appendages; appendages comprising a cup-like collar containing mucilage (Figs. 25–33).

**K n o w n d i s t r i b u t i o n .** – Indonesia (Java).

**K n o w n h o s t .** – Palms (indet.).

**M a t e r i a l e x a m i n e d .** – INDONESIA: Java, Cibodas, on frond of palm, Oct. 1992, K. D. Hyde 1125b, BRIP 23006 (holotype).



Figs. 25-35. – *Pemphidium palmicola*. – 25-33. Ascospores with polar appendages. – 34. Paraphyses. – 35. Asci with subapical rings. – Bars = 10 µm.

*Pemphidium palmicola* can conveniently be included in the genus *Pemphidium* as it has many characters similar to those of *P. nitidum* (Hyde, 1993). It differs from the two species of *Pemphidium* accepted by Hyde (1993) in its very long ascospores. It also differs from *P. calamicola* which has shorter and wider ascospores and ascomata developing under blackened sunken oval regions.

These two new species from Australia and Indonesia are the first records of *Pemphidium* outside South America. The genus is quite rare, unlike *Linocarpon* which is also common on palms and has a similar superficial appearance. Several collections of *Linocarpon*-like species from Brazil (Amazonia) made by Gary Samuels have been examined and it appears that *Pemphidium* may be common on decaying palm fronds in that region. In collections from palms in Cuyabeno rainforest in Ecuador, however, no evidence of *Pemphidium* was found.



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