A synopsis of and a key to *Diplococcium* species, based on the literature, with a description of a new species

**Teik-Khiang Goh** and Kevin D. Hyde

Fungal Diversity Research Project, Department of Ecology and Biodiversity, The University of Hong Kong, Pokfulam Road, Hong Kong; * email: tkgo@hkucc.hku.hk


The genus *Diplococcium* is reviewed, together with a synopsis of 21 accepted species and a composite diagram of their conidial morphology. A further 11 species which have either been synonymised, transferred to other genera, or are questionably placed in *Diplococcium*, are discussed. Probable teleomorphic states in the genera *Helminthosphaeria* and *Otthia* are briefly discussed. *Diplococcium varioseptatum* sp. nov. is proposed for the presumed anamorph of *Helminthosphaeria corticiorum*. A key to accepted species is provided.

**Introduction**

The hyphomycete genera *Spadicoides* S. Hughes and *Diplococcium* Grove produce conidia from polytretic conidiogenous cells (Ellis, 1971b; Holubová-Jechová, 1982). When conidia detach, pores are clearly visible on the conidiogenous cells. Both genera produce conidia which are unicellular or have up to 7-eusepta. In many species, the septa are thick and darkly pigmented. The generic concepts of these genera have been revised by Sinclair, Eicker and Bhat (1985), and branching of conidiophores is not considered an important criterion separating them. Catenation of conidia is currently the sole diagnostic character separating *Diplococcium* from *Spadicoides*.

There are presently thirty binomial names in *Diplococcium* (Hughes, 1953, 1958; Ellis, 1963, 1971a, 1971b, 1976; Pirozynski, 1972; Sutton, 1973; Holubová-Jechová, 1982; Wang and Sutton, 1982; Sinclair *et al.*, 1985; Subramanian and Sekar, 1989; Castañeda Ruiz and Kendrick, 1991; Matsushima, 1993; Goh, Hyde and Umali, 1998), some of which have been transferred to other genera (Hughes, 1958; Ellis, 1971b, 1976; Sinclair *et al.*, 1985). The genus *Spadicoides* has been reviewed by Goh and Hyde (1996). In the present paper, we present a bibliographic reflection on the genus *Diplococcium*. Brief notes are provided with respect to the validity in nomenclature, current taxonomic status, outstanding features, and geographical
distribution of each of the 30 Diplococcium names. We also examined isotype material of Diplococcium asperum Piroz. (DAOM 133941c) and D. capitatum Piroz. (DAOM 133945), and their taxonomic status are discussed. Authentic material of Diplococcium species in association with Helminthosphaeria species (Herb. BPI) were examined, and the presumed anamorph-teleomorph connections of these fungi (Samuels, Candoussau and Magni, 1997) are briefly discussed. Based on the literature and examination of available authentical material, we consider 21 species as acceptable in Diplococcium, while 6 species are regarded as doubtful because of insufficient information. To facilitate identification, some diagnostic characters of the accepted species are presented in Table 1, their conidia are illustrated (Figs. 1-21), and a key is provided.

Taxonomy

Species accepted in Diplococcium

Key to accepted species of Diplococcium

1. Conidia verrucose, ellipsoidal to obclavate, 1-septate, 15-20 × 6-7 μm; conidiophores unbranched; on decaying palm rachides .............. D. asperum

1. Conidia smooth ................................................................. 2

2. Conidia versicolored, with one or more cells distinctly darker than the other .................................................. 3

2. Conidia concolorous, with all the cells of the same color .............. 11

3. Conidiophores branched ......................................................... 4

3. Conidiophores unbranched ........................................................ 7

4. Mature conidia nonseptate, ovate to obpyriform, 8.5-13 × 5.5-8 μm; conidiophores 3-6 μm wide .............................................. D. parcum

4. Mature conidia uniseptate, ellipsoidal, clavate, obclavate or lageniform, 4-6 μm wide; conidiophores 2.5-4 μm wide ........................................ 5

5. Conidiophores dichotomously branched; conidia ellipsoidal, obovoid or clavate, 9-16.5 × 4.5-6 μm ................................................. D. lawrencei

5. Conidiophores irregularly branched; conidia pyriform, obclavate, or lageniform ...................................................... 6

6. Conidia obclavate to lageniform, septum closer to the apex, not constricted at the septum, basal cell darker than apical cell, 11-20 × 4.5-5 μm .......................................................... D. bicolor
6. Conidia pyriform to ellipsoidal, septum closer to the base, constricted at the septum, apical cell darker than the basal cell, 5-13 × 4-5 μm ............................................................... *D. aquaticum*

7. Mature conidia 1-septate, 11-15 × 3-4.5 μm; on dead grass culms ........................................................................................................... *D. graminearum*

7. Mature conidia 2- or 3-septate, 9.5-40 μm long, 7-13 μm wide; on dead leaves or rotten wood ................................................................. 8

8. Conidiophores 3-4 μm wide; mature conidia 2-septate, constricted at septa, subellipsoidal, central cell larger and darker than end cells, 17-25 × 7-9 μm, borne in acropetal chains; occurring on dead leaves ............. *D. laxusporum*

8. Conidiophores 3.5-8 μm wide; mature conidia 2- or 3-septate, of other shapes or combination of conidial characters not as above; occurring on rotten wood ........................................................................ 9

9. Mature conidia 2-septate, base broader than the apex (broadly obclavate, cylindric-obclavate, ovate or ellipsoidal) .................. *D. insolitum*

9. Mature conidia mostly 3-septate, apex broader than the base (clavate or obovoidal). ................................................................. 10

10. Conidiophores 6-7.5 μm wide; conidia 20-40 × 8-10 μm, constricted at the septa ................................................................................. *D. constrictum*

10. Conidiophores 3.5-6 μm wide; conidia 16-26 × 8-13 μm, not constricted or rarely slightly constricted at the septa .......................... *D. grovei*

11. Conidiophores branched ........................................................................ 12

11. Conidiophores simple .......................................................................... 17

12. Mature conidia clavate, obclavate, ellipsoidal or subcylindrical, 5.6-15 μm wide; occurring on fruit bodies of Basidiomycetes .............. 13

12. Mature conidia, oblong, elliptical or cylindrical, 3-7.5 μm; occurring on wood or leaves ........................................................................ 15

13. Mature conidia 0-1-septate, 13-29 × 6-9 μm; overgrowing carpophores of Clavariaceae .......................................................... *D. clavariarum*

13. Mature conidia with 2-3 or more septa; overgrowing carpophores of Corticiaceae.................................................................................... 14
14. Conidia (11-)19-42(-55) × (5-)7-11(-15) μm, with 1-5 septa, cylindrical to ellipsoidal ................................................................. *D. variepipatum*

14. Conidia 16-32 × 5.6-9 μm mostly 3-septate, ellipsoidal, obclavate or subcylindrical .................................................. *D. clarkii*

15. Mature conidia mostly 0-septate, occasionally 1-3-septate, 8-40 × 4.5-6 μm; occurring on living leaves of *Pandanus* ........................................... *D. pandani*

15. Mature conidia mostly 1-septate, occurring on rotten wood .................................................. 16

16. Conidia 6-9 × 3-4 μm .............................................................. *D. spicatum*

16. Conidia 12-30 × 5-7.5 μm .......................................................... *D. pulneyense*

17. Occurring on stromata of *Diatrype*; conidiophores 3-3.5 μm wide; conidia 0-1-septate; 4.5-10 × 2.5-4 μm ............................................. *D. heterosporum*

17. Occurring on bamboo culms or palm material; conidiophores 3.5-9 μm wide ................................................................. 18

18. Mature conidia 0-septate, 7.5-12 × 2.5-5.5 μm; conidiophores 3.5-4 μm wide, with conidiogenous pores confined to swollen terminal cell ................................................................. *D. capitatum*

18. Mature conidia 1-7-septate, 12-34 × 6-10.5 μm; conidiophores 4-9 μm wide, conidiogenous pores not as above .................................................. 19

19. Mature conidia (1-2-)3-7-septate, constricted, not darkly pigmented at the septa, cylindro-obclavate, 14-33 × 6-9 μm .................................................. *D. stoveri*

19. Mature conidia 1(-2)-septate, not constricted, darkly pigmented at the septa, oblong, ellipsoidal, broadly fusiform or ovate .................................................. 20

20. Conidiophores subulate, 7.5-12 μm wide; mature conidia oblong or ellipsoidal, 12-22 × 6-9 μm; occurring on decaying bamboo culms ................................................................. *D. dendrocalami*

20. Conidiophores cylindrical, 4-6 μm wide; mature conidia broadly fusiform or ovate, 12-34 × 7-10.5 μm; occurring on rotten palm petioles ................................................................. *D. peruamazonicum*


This species is unique in the genus in having slender (2.5-3 μm wide) conidiophores and pyriform conidia. It is comparable to *D. graminearum* which
Table 1. Synopsis of accepted species of *Diplococcum*.

<table>
<thead>
<tr>
<th>Species</th>
<th>Conidiophores branching/size</th>
<th>Conidiophores shape</th>
<th>Conidia wall</th>
<th>Conidia colour</th>
<th>Conidia septation</th>
<th>Size</th>
<th>Habitat</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>D. aquaticum</em></td>
<td>X / 80-140 × 2.5-3</td>
<td>ellipsoid, pyriform</td>
<td>smooth vers-</td>
<td>1, constricted,</td>
<td>5-13 × 4-5</td>
<td></td>
<td>submerged wood</td>
</tr>
<tr>
<td><em>D. asperum</em></td>
<td>X / -250 × 4-5</td>
<td>ellipsoid, obclavate</td>
<td>rough con-</td>
<td>1, constricted,</td>
<td>15-20 × 5.5-7</td>
<td></td>
<td>rotten palm rachides</td>
</tr>
<tr>
<td><em>D. bicolor</em></td>
<td>X / 90-400 × 2.5-4</td>
<td>obclavate, lageniform</td>
<td>smooth versi-</td>
<td>1, not constricted,</td>
<td>11-20 × 4-5.5</td>
<td></td>
<td>rotten wood</td>
</tr>
<tr>
<td><em>D. capitatum</em></td>
<td>X / -180 × 3.5-4</td>
<td>short cylindric, broadly ellipsoid</td>
<td>smooth con-</td>
<td>0</td>
<td>7.5-12 × 2.5-5.5</td>
<td></td>
<td>rotten palm rachides</td>
</tr>
<tr>
<td><em>D. clarkii</em></td>
<td>X / 70-200 × 4-8</td>
<td>ellipsoid, subcylindric, obclavate</td>
<td>smooth con-</td>
<td>1-3, not constricted,</td>
<td>16-32 × 5.6-9</td>
<td></td>
<td>basidiomata (Stereales)</td>
</tr>
<tr>
<td><em>D. clavariarum</em></td>
<td>X / 50-120 × 3-5</td>
<td>ellipsoid, clavate, obclavate</td>
<td>smooth con-</td>
<td>0-1, not constricted,</td>
<td>13-29 × 6-9</td>
<td></td>
<td>basidiomata (Clavaria)</td>
</tr>
<tr>
<td><em>D. constrictum</em></td>
<td>X / 100-360 × 6-7.5</td>
<td>obvoid, clavate</td>
<td>smooth versi-</td>
<td>2-3, not constricted,</td>
<td>20-40 × 8-10</td>
<td></td>
<td>rotten wood</td>
</tr>
<tr>
<td><em>D. dendrocalami</em></td>
<td>X / 120-280 × 7.5-12</td>
<td>oblong, ellipsoid</td>
<td>smooth con-</td>
<td>1-2, not constricted,</td>
<td>12-17 × 6-9</td>
<td></td>
<td>rotten bamboo culms</td>
</tr>
<tr>
<td><em>D. graminearum</em></td>
<td>X / -300 × 3-4</td>
<td>narrowly obpyriform, obclavate</td>
<td>smooth versi-</td>
<td>1, constricted, not banded</td>
<td>11-15 × 3-4.5</td>
<td></td>
<td>dead grass stem</td>
</tr>
<tr>
<td><em>D. grovei</em></td>
<td>X / -350 × 3.5-6</td>
<td>obovate, clavate</td>
<td>smooth versi-</td>
<td>3, not constricted,</td>
<td>16-26 × 8-13</td>
<td></td>
<td>rotten wood</td>
</tr>
<tr>
<td><em>D. heterosporum</em></td>
<td>X / 150-200 × 3-3.5</td>
<td>elliptical, obovate</td>
<td>smooth con-</td>
<td>0-1, constricted, not banded</td>
<td>4.5-10 × 2.5-4</td>
<td></td>
<td>stromata of Diatrype</td>
</tr>
<tr>
<td><em>D. insolitum</em></td>
<td>X / 40-120 × 3.5-8</td>
<td>broadly obclavate, ellipsoid</td>
<td>smooth versi-</td>
<td>2, not constricted,</td>
<td>9.5-22 × 8-11</td>
<td></td>
<td>rotten wood</td>
</tr>
<tr>
<td><em>D. lawrencei</em></td>
<td>X / 120-320 × 2-3.5</td>
<td>ellipsoid, clavate</td>
<td>smooth versi-</td>
<td>1, not constricted, banded</td>
<td>9-16.5 × 4.5-6</td>
<td></td>
<td>rotten wood</td>
</tr>
<tr>
<td>Species</td>
<td>Conidiophores branching/size</td>
<td>Conidia</td>
<td>Habitat</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>-----------------------------</td>
<td>---------</td>
<td>-----------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>D. laxusporum</em></td>
<td>X / 170-250 x 3-4</td>
<td>subellipsoid smooth versi- 2, constricted, banded</td>
<td>17-25 x 7-9</td>
<td>dead leaves</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>D. pandani</em></td>
<td>√ / -400 x 4-5</td>
<td>ellipsoid, cylindric smooth con- 0, occasionally 1-3</td>
<td>8-40 x 4.5-6</td>
<td>living Pandanus leaves</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>D. parcum</em></td>
<td>√ / 70-300 x 3-6</td>
<td>ovate, ellipsoid, obpyriform smooth versi- 0</td>
<td>8.5-13 x 5.5-8</td>
<td>rotten wood</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>D. peruamazonicum</em></td>
<td>X / 130-500 x 4-6</td>
<td>broadly fusiform, ovate smooth con- 1-2, not constricted, banded</td>
<td>12-34 x 7-10.5</td>
<td>dead palm petiole</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>D. pulneyense</em></td>
<td>√ / -300 x 3-5.5</td>
<td>elliptic, subcylindric smooth con- 1-2, constricted, not banded</td>
<td>12-30 x 5-7.5</td>
<td>dead wood</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>D. spicatum</em></td>
<td>√ / 200-400 x 2.5-4</td>
<td>oblong, ends rounded smooth con- 1, constricted, not banded</td>
<td>6-9 x 3-4</td>
<td>rotten wood</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>D. stoveri</em></td>
<td>X / -550 x 5-8</td>
<td>cylindric, obclavate smooth con- 1-7, constricted, not banded</td>
<td>14-33 x 6-9</td>
<td>living Elaeis leaves</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>D. varie septatum</em></td>
<td>√ / -250 x 4-6</td>
<td>cylindric, ellipsoid smooth con- 1-5, constricted, banded</td>
<td>11-55 x 5-15</td>
<td>basidiomata (Corticiaceae)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

√ = branched; versi- = conidial cells differ in pigmentation; = Measurements in µm.
X = unbranched; con- = conidial cells of the same pigmentation.
also produces uniseptate, versicolored conidia. The latter, however, differs in its unbranched conidiophores, obpyriform conidia with a central septum, and darker basal cell.


   (Figs. 2, 22-26)


   This species described from palms is unique in having verrucose, uniseptate conidia (Pirozynski, 1972). It was transferred to *Spadicoides* on the basis of unbranched conidiophores (Wang and Sutton, 1982), but the transfer was not accepted by Sinclair *et al.* (1985) because of its catenate conidia. Holubová-Jechová (1982) proposed the exclusion of this species from *Diplococcium* on the basis of her observation of “atypical” conidiogenous pores. Based on our examination of the holotype, in which conidiogenous pores typical of *Diplococcium* were apparent (Figs. 23-25), we consider this an acceptable species.

3. **Diplococcium bicolor** Hol.-Jech., Folia Geobotanica et Phytotaxonomica, Praha 17: 317 (1982). (Fig. 3)

   This species produces lageniform to obclavate, uniseptate, versicolored conidia. It is unique in that the conidia occur in branched chains and are often aggregated in whorls around the conidiogenous cells. It is known only from the type locality (Czechoslovakia).


   (Figs. 4, 27-31)


   This species described from palms is unique in having unbranched conidiophores which bear terminal, irregularly swollen or bulbous, polytretic conidiogenous cells. Percurrent regeneration of the conidiophores has been noted (Pirozynski, 1972). Holubová-Jechová (1982) considered the conidiogenous cells in this species “atypical” and proposed its exclusion from *Diplococcium*. We consider *D. capitatum* an acceptable species because conidiogenous pores
typical of *Diplococcium* are clearly visible (Figs. 29, 30) in the type material (DAOM). It is known only from the type locality (Tanzania).

   

   **Material examined:** FRANCE, Hautes Pyrénées, Capvern, on Corticiaceae, 4 Sep. 1994, F. Candoussau FC300 (BPI 749440); *ibid.*, Bois de Amou, on Corticiaceae on *Alnus* sp., 25 Aug. 1986, F. Candoussau FC350 (BPI 749456); *ibid.* Pyrénées Atlantique, Bois de Pau, on Corticiaceae, 30 July 1995, F. Candoussau FC381 (BPI 749425). SWITZERLAND, Kt. Thurgau, Grutried, near Wangi, on decorticated wood of *Alnus glutinosa*, 23 June 1974, W. Matheis FC376 (BPI 749448).

   This species has been reported from living basidiomata of *Cristella confinis*, *Hyphoderma praetermissum*, and other corticiaceous basidiomycetes (Ellis, 1976; Holubová-Jechová, 1982; White and Ginns, 1984). Based on examination of material from BPI, we consider the *Diplococcium* species which has been frequently found in association with *Helminthosphaeria odontiae* (Samuels et al., 1997) is conspecific with *D. clarkii*. The distribution of *D. clarkii* now includes Canada, Czechoslovakia, France, Sweden, Switzerland, and the United Kingdom.

   
   **Teleomorph:** presumably *Helminthosphaeria clavariarum* (Tul.) Fuckel, Symb. Mycol.: 166 (1870).

   This well documented species is known to occur on aphyllorphanaceous basidiomata of the Clavariaceae (Ellis, 1963; Holubová-Jechová, 1982; Samuels et al., 1997).


Conidia in this species are described as solitary in Wang and Sutton (1982). Conidial catenation is, however, obvious on the basis of new conidia being produced from the basal cell of primary conidia (Sinclair et al., 1985). Several collections from New York have been recorded (Wang and Sutton, 1982).

8. *Diplococcium dendrocalami* Goh, K.D. Hyde and Umali, Mycologia 90: 515 (1998). (Fig. 8)

This species somewhat resembles *D. clavariarum* since the conidia are approximately the same width, ellipsoidal, thick-walled, and have a thick dark septum. The latter is a parasite on carpophores of *Clavaria* species (Holubová-Jechová, 1982; Samuels et al., 1997) whereas *D. dendrocalami* is saprophytic. It also differs from *D. dendrocalami* in having conidiophores which are mainly branched and slender (3.5-6 µm wide). *Diplococcium dendrocalami* is also comparable to *D. insolitum* in which the conidiophores are attenuated and sometimes regenerated percurrently. However, the conidia in *D. insolitum* are mainly 2-septate, versicolored and broadly obclavate (Holubová-Jechová, 1982).

9. *Diplococcium graminearum* R.F. Castañeda and W.B. Kendr., University of Waterloo Biology Series 35: 47 (1991). (Fig. 9)

This species was described from dead stem of a grass. It is known only from the type locality (Cuba).

10. *Diplococcium grovei* (M.B. Ellis) R.C. Sinclair, Eicker and Bhat, Transactions of the British Mycological Society 85: 736 (1985). (Fig. 10)


This is an acceptable species based on its catenate conidia (Wang, 1976), although the conidiophores are unbranched. It is known from Canada, the United Kingdom and the United States of America.

11. *Diplococcium heterosporum* G. Arnaud ex Zeller and Tóth, Botanikai Közлемények 49: 108 (1961). (Fig. 11)

Conidia of this species are unicellular (4.5-5 × 2.5-3.5 µm) or unisepate (7-10 × 3-4 µm), guttulate, and borne in short chains from unbranched conidiophores. It is known only from the type locality (Hungary).
12. *Diplococcium insolitum* Hol.-Jech., Folia Geobotanica et Phytotaxonomica 17: 321 (1982). (Fig. 12)  

This species is distinct in the genus in having unbranched conidiophores and broadly obclavate, 2-septate, versicolored conidia. Percurrent regeneration of the conidiophores has been reported (Holubová-Jechová, 1982).

13. *Diplococcium lawrencei* B. Sutton, Mycological Papers 132: 49 (1973). (Fig. 13)

This is a distinct species having dichotomously branched conidiophores. It resembles *D. clavariarum* but has smaller conidia. It is reported from Canada, Czechoslovakia, Poland, and the United States of America.


This species was described from dead leaves of *Bucida palustris* and known only from the type locality (Cuba). It is comparable to *D. clarkii*, but differs in having unbranched conidiophores and 2-septate, versicolored conidia.

15. *Diplococcium pandani* B. Huguenin, Bulletin Soc. Mycol. France, 80: 185 (1964). (Fig. 15)

This species was reported to occur on living leaves of *Pandanus tectorius* (Ellis, 1976). The catenate conidia are mostly nonseptate but occasionally have 1-3 septa.

16. *Diplococcium parcum* Hol.-Jech., Folia Geobotanica et Phytotaxonomica, Praha 17: 315 (1982). (Fig. 16)

This species is distinct in producing nonseptate, obpyriform conidia in short branched chains. It is known only from Czechoslovakia (Holubová-Jechová, 1982).

17. *Diplococcium peruamazonicum* Matsush., Matsush. Mycol. Mem. 7: 49 (1993). (Fig. 17)
This species was reported from decaying palm petioles. It is known only from the type locality (South America).


(Fig. 18)

This species was reported as the anamorphic state of *Otthia pulneyensis* Subram. and Sekar in culture (Subramanian and Sekar, 1989).

19. *Diplococcium spicatum* Grove, *J. Bot.*, London 23: 167 (1885). (Fig. 19)

The type species of the genus, it produces uniseptate, short cylindrical conidia in short or long chains. It is common on dead wood and bark of various broad-leaved and coniferous trees. Records of this fungus include Canada, Czechoslovakia, Japan, Poland, Rumania and the United Kingdom.

20. *Diplococcium stoveri* (M.B. Ellis) R.C. Sinclair, Eicker and Bhat, Transactions of the British Mycological Society 85: 736 (1985). (Fig. 20)

≡ *Spadicoides stoveri* M.B. Ellis, Mycological Papers 131: 22 (1972).

This species is distinct in having 1-7-septate conidia. The conidiophores are unbranched, borne singly or in fascicles from stromata on leaves of *Elaeis guineensis*. The conidia are usually solitary but occasionally produced in short chains.


(Figs. 21, 32-34)

Etymology: varieseptatum, referring to the septation of the conidia which varies from uniseptate to 5-septate.

Coloniae in substrato naturale effusae, atrobrunneae. Conidiophora solitaria vel sparse fasciculata, ramosa, erecta, cylindrica, usque 250 µm longa, 4-6 µm lata, distincte multiseptata, saepe ad septa constricta, crassitunicata, laevia, griseobrunnea. Conidiosephores in conidiophoris incorporatae, polytreticae, terminales et intercalares. Conidia catenulata, cylindrica vel ellipsoidea, (11-)19-42(-60) × (5-)7-11(-15) µm, utrinque late rotundata vel interdum ad basem obconica, crassitunicata, laevia, (1-)2-3(-5)-septata, ad septa non constricta vel leniter constricta, pallide brunnea, concoloria; septa ca 1.5-3 µm crassa et atriora.

Holotypus: FRANCE, Bois de Feuilles, 64 Bonnut, 60 km de la Côte Atlantique, in *Phanaerochaeta sordida*, 9 Apr. 1995, F. Candoussau, FC360 (BPI 749438).

Colonies on natural substratum effuse, dark brown. Mycelium immersed. Setae and hyphopodia absent. Conidiophores arising singly or in small groups,
Figs. 32-34. Diplococcium varieptatum (from holotype, BPI 749438). 32. Squash mount of conidiophores and chains of conidia. 33, 34. Conidia. Bars = 10 μm.

branched, erect, cylindrical, up to 250 μm long, 4-6 μm wide, distinctly multisepate, often constricted at the septa, thick-walled, smooth, greyish brown. Conidiogenous cells integrated, polytretic, terminal and intercalary. Conidia borne in short chains, cylindrical to ellipsoidal, (11-)19-42(-60) × (5-)7-11(-15) μm, broadly rounded at both ends or sometimes obconical at the base, thick-walled, smooth, (1-)2-3(-5)-septate, not constricted or slightly constricted at the septa, translucent brown, concolorous; septa ca 1.5-3 μm thick and darkly pigmented.


Other material examined: FRANCE, Ariège, 09410 Moulis, on Hyphoderma sp., 8 June 1995, N. de Munnik 0806 comm. FC370 (BPI 749435); ibid. 09800 Lac de Bethmale, elev. 1300 m, on Phanaerochaete sordida, June 1995, N. de Munnik 2702 comm. FC371 (BPI

This species has been found in association with Helminthosphaeria corticiorum on several occasions (five out of fifteen specimens examined). Since the anamorph-teleomorph connection has yet to be proved, it is described here as a new Diplococcium species. It is unique in the genus with its large conidia with 1-5 thick septa. More illustrations of this species with its presumed teleomorph are provided by Samuels et al. (1997).

Unacceptable, rejected, and questionable species

This is an unacceptable species on the basis of the non-catenate conidia borne on short denticles on conidiogenous cells. It has been transferred to Scolecobasidiella avellanea (Sappa and Mosca) M.B. Ellis (1971a).


The mature conidia in this species are ovate to broadly obclavate, 2(3)-septate and borne in chains. The conidiophores are unbranched. Percurrent regeneration of the conidiophores has been reported (Wang and Sutton, 1982). The overall morphology is very similar to D. insolitum Hol-Jech. (Holubová-Jechová, 1982) and we consider them to be conspecific. The name D. insolitum takes precedence.


The status of this species in Diplococcium is uncertain based on the short description in Saccardo (1886). The conidiophores are branched and the conidia are uniseptate, ovoid and catenate. It was originally described from living leaves of Pelargonium (Geraniaceae).

This species was originally described from decaying wood of *Pinus* producing cylindrical, 0-1-septate, subhyaline, 12-15 × 3 μm conidia in short branched chains. It may be an acceptable species based on its conidial morphology, but it is not clear if the conidiogenous cells are polytretic.


The conidia in this species are unicellular and solitary. It has been synonymised with *Spadicoides atra* (Corda) S. Hughes (1958).


The status of this species in *Diplococcium* is uncertain based on the short protologue. It was originally described from a decaying stem of *Brassica oleracea*. The conidia are uniseptate, ovoid, and catenate. It is not clear whether the conidiogenous cells are polytretic.


This is an unacceptable species in *Diplococcium*. The conidia are solitary and are not produced from polytretic conidiogenous cells.


The status of this species in *Diplococcium* is uncertain based on the short protologue. The conidia are uniseptate, rounded at both ends, smooth, and catenate. It was described from decaying wood. It is unclear whether the conidiogenous cells are polytretic.


This species appears to be unacceptable in *Diplococcium*. It was originally described from roots of *Pinus* sp. The conidiophores and conidia are both coarsely verrucose and darkly pigmented to almost black. The conidia are uniseptate, ellipsoidal and borne in long, monilioid chains. It is unclear whether the conidiogenous cells are polytretic.


The conidia in this species are fusiform, dark-olivaceous, mostly 1-septate, very rarely 2-septate, 12-15 x 6 μm, and borne in long, branched chains. This may be an acceptable species based on the conidial morphology, but it is unclear if the conidiogenous cells are polytretic.


\[= Virgaria uniseptata\] Berk. and M.A. Curtis, Grevillea 3: 145 (1875).

\[= Cladotrichum uniseptatum\] (Berk. and M.A. Curtis) Sacc., *Sylloge Fungorum* 4: 373 (1886).


The conidia in this species are uniseptate and produced singly from unbranched conidiophores. It has been synonymised with *Spadicoides bina* (Corda) S. Hughes (1958).

**Notes on anamorph-teleomorph connections**

Two preliminary records of possible teleomorphs of *Diplococcium* were given by Subramanian (1983), one a member of the Pleosporaceae and the other a species of *Helminthosphaeria* Fuckel. The connection of *Diplococcium pulneyense* with *Otthia pulneyensis* Subram. and Sekar, a member of the Dothideales, has been established in single-ascospore culture (Subramanian and Sekar, 1989). Several fungicolous *Helminthosphaeria* species have also been associated with *Diplococcium* species (Samuels *et al.*, 1997). The biological connection of *Diplococcium* with *Helminthosphaeria* has not been unequivocally proved. The anamorph-teleomorph connection is presumed due to the consistent close and constant physical association of the two fungi in nature.
Unfortunately there is no report of any species of *Helminthosphaeria* having been cultured (Samuels *et al.*, 1997).

**Acknowledgements**

We wish to thank the curators of DAOM and BPI for the loan of type specimens examined in this study. We are grateful to Dr. E.C.H. McKenzie (Landcare Research, New Zealand) for his critical review of the manuscript. Helen Leung, A.Y.P. Lee, and Ken M.K. Wong are thanked for their technical and photographic assistance. The University of Hong Kong is thanked for the award of a Post-doctoral Fellowship to T.K. Goh.

**References**


