ASCOCHYTULA, ASCOCHYTELLA, ASCOCHYTA AND RELATED FUNGI, WITH SPECIAL REFERENCE TO ASCOCHYTA PASPALI.

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'Creator mundum ita instruxit, ut homo ubique miracula illius manu facta adspiciat.'*

Linnaeus,1752 (fide Kickx,1867).

*'The Creator teaches mankind thus, so that men can see everywhere the miracles His hand has made.'

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ABSTRACT

Two Coelomycete genera, *Ascochytula* Died. and *Ascochytella* Tassi, were studied in order to determine their generic affinities, especially with *Ascochyta*. *Ascochytula obiones* (Jaap) Died., the type species of *Ascochytula*, is considered to be congeneric with *Ascochyta pisi* Lib., the type species of the earlier genus, *Ascochyta* Lib. *Ascochytula* is thus reduced to synonymy with *Ascochyta*. Of the thirty-six species and two varieties named in, or directly associated with, *Ascochytula*, twenty are herein described as species of *Ascochyta* and four are excluded from *Ascochyta*. The remaining species were either not examined, or are *nomina dubia*. The following names are proposed: *Ascochyta asparagina* (Petrak) comb. nov., *A. deformis* (P. Karsten) comb. nov., *A. dorycnii* (Petrak) comb. nov., *A. ludwigiana* (Petrak) comb. nov., *A. moravica* (Petrak) comb. nov., *A. obiones* (Jaap) comb. nov., *A. phlomidicola* nom. nov., and *A. ulicis* (Grove) comb. nov.

Ascochytella Tassi, which has often been confused with *Ascochytula*, is also synonymised with *Ascochyta*. The original thirteen species in *Ascochytella* were examined, and *A. vicina* (Sacc.) Tassi chosen as the lectotype species. Most of the thirteen species are regarded as being either misplaced in *Ascochytella*, or *nomina dubia*, and only four, including the lectotype, are accepted as species of *Ascochyta*. The name, *Placodiplodia canthiifolia* (Cooke & Massee) comb. nov. is proposed.

The type species of *Ascochyta*, and of six related genera, *Ascochytulina* Petrak, *Coniothyrium* Corda, *Diplodina* Westend., *Pseudodiplodia* (P. Karsten) Sacc., *Scolecosporiella* Petrak, and *Stagonospora* (Sacc.) Sacc. were studied to determine the distinctions between these six genera and *Ascochyta*. *Microdiplodia* Allescher and *Diplodia* Fr. are also discussed, in relation to *Ascochyta*.

Ascochyta paspali (H. Sydow) Punith.(≡ Ascochytula paspali H. Sydow), which causes a leaf stripe disease of Paspalum dilatatum Poir., an important perennial grass of northern North Island pastures, was examined in detail. At some temperatures, under controlled climate conditions, the fungus significantly reduced the yield of P. dilatatum. A. paspali was found to grow systemically, as mycelium within the xylem vessels, and was able to infect all parts of the plant, including the roots and seeds. Green leaves sometimes became infected systemically without production of visual symptoms. Infected seed is suggested as a means for disease spread. No teleomorph for A. paspali was found, and the fungus is thought to overwinter in the dormant grass. The seasonal fluctuation in levels of P. dilatatum and of the disease was studied in two Northland pastures with paspalum as a component. One pasture was studied for fourteen months, and the other for four months. Disease levels, and paspalum levels, were determined by point quadrat analysis and by sorting of randomly cut samples. Levels of both the host and of the disease peaked in summer, while both were at low levels, or apparently absent, over the winter months.

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GLOSSARY

The glossary includes definitions of terms used in the text and descriptions. These terms relate either to mycology or grass morphology. Terminology of shape follows Ainsworth (1971, fig. 16), and is not repeated here.

acervular conidioma - an immersed conidioma consisting of a flat hymenial layer developing on a pseudoparenchymatic stroma and covered by host tissues. At maturity, the covering host tissues usually split to expose the hymenium, allowing release of the conidia.

acervulus - see acervular conidioma.

amerospore - a nonseptate spore with a length : width ratio not exceeding 15:1 ; if elongated, with only a single axis, and that axis not curved through more than 180°; any protuberances, other than setulae, not more than ¼ the length of the spore body (Kendrick & Nag Raj, 1979).

anamorph - any form or state or organ ('morph') of asexual or somatic reproduction that has distinct morphology (De Vroey & Hennebert, in press).

annellide - a conidiogenous cell which produces its first conidium holoblastically, and subsequent conidia enteroblastically and basipetally. Through percurrent proliferation of the conidiogenous cell, each conidium secedes at a higher locus than the previous conidium, and leaves behind a ring-like scar, or annellation, at the point of secession.

basipetal - a succession of conidia in which the youngest conidium is closest to the conidiogenous locus.

blade - see leaf blade

channel - that region at the phialide apex surrounded by the periclinal thickening and collarette, through which conidia emerge.

clypeus - a pseudoparenchymatic fungal tissue surrounding the conidiomal apex, and often extending beyond the diameter of the conidioma.

coelomycete - an artificial grouping of fungi which produce conidia within acervular, pycnidial, pycnothyrial, or stromatic conidiomata.

collarette - the outer, ruptured wall layer at the apex of a phialide, formed after secession of the first, holoblastic conidium. The collarette often encloses a periclinal thickening, and may extend beyond, or be of a similar length to this thickening, depending on the level at which the wall ruptures during secession of the first conidium.

confluent (conidiomata) - joined by hyphae, cells, or stromatic tissue (Sutton, 1980).

conidiogenesis - the process of development of conidia from conidiogenous cells.

conidiogenous cell - a fungal cell which produces a conidium.

conidiogenous locus - see locus

conidioma (pl. conidiomata) - a specialized, multi-hyphal, conidium-bearing structure (Kendrick & Nag Raj, 1979).

conidiophore - a specialized hypha or fungal cell(s) which supports a conidiogenous cell (Cole & Samson, 1979; Sutton, 1980).

conidium (pl. conidia) - a haploid spore produced from a conidiogenous cell by deuteromycetous (anamorphic) fungi.

culm - the stem of a grass, with long, usually hollow internodes and swollen, solid nodes; produced by elongation of the lower internodes of the axis, and bearing the inflorescence at its apex.

didymospore - a spore with one septum across the body; with a length:width ratio not exceeding 15:1 ; if elongated, with only a single axis, and that axis not curved through more than 180° ; any protuberances, other than setulae, not more than ¼ the length of the spore body (Kendrick & Nag Raj, 1979).

discrete (conidiogenous cells) - in coelomycetous fungi, arising directly from cells of the conidiomal wall and not supported by a conidiophore.

eccentric (septum) - displaced to one side, not median.

eguttulate - absence of oil droplets in the conidial cell(s); opposite of guttulate.

enteroblastic (conidiogenesis) - development of a conidium by the blowing out of the inner wall only of the conidiogenous cell prior to the formation of a septum delimiting the conidium.

eustroma - a mass of fungal cells or interwoven hyphae forming a structured tissue with one or more locules variously arranged, but excluding acervular and pycnidial conidiomata (Sutton, 1980).

flag leaf - the uppermost leaf on the culm of a grass, subtending the inflorescence.

holoblastic (conidiogenesis) - development of a conidium by the blowing out of all wall layers of the conidiogenous cell prior to the formation of a septum delimiting the conidium.

holomorph - the whole morphology shown by a fungus, including both the anamorph(s) and teleomorph (De Vroey & Hennebert, in press).

integrated (conidiogenous cell) - supported by a conidiophore (Sutton 1980).

lamina - see leaf blade.

leaf blade or lamina - the upper, expanded part of a grass leaf above the ligule.

leaf sheath - the lower, cylindrical part of a grass leaf below the ligule, arising from a node.

ligule - a thin, membranous outgrowth on the adaxial surface at the junction of the leaf blade and sheath of a grass.

locule (of a conidioma) - the cavity enclosed by fungal, host, or fungal/host tissue (Sutton, 1980).

(conidiogenous) locus - the specific area of a conidiogenous cell from which a conidium is produced. In a phialide, this locus is fixed; in an annellide, it advances with the proliferating apex of the conidiogenous cell.

longitudinal (conidioma) - longer than broad.

lumen - the cytoplasmic membrane and enclosed cytoplasm of a cell.

monophialide - a phialide with a single conidiogenous locus.

ostiole - a preformed, circular or oval pore at the apex of a pycnidial conidioma, through which conidia are discharged.

panicle - a type of grass flowerhead where the spikelets are borne on branches off the main axis (rachis).

pedicel-the stalk on which a grass spikelet is borne.

percurrent proliferation - growth of a conidiogenous cell, through its own apex, after secession of a conidium, as in annellides and proliferating phialides.

periclinal thickening - that region between the collarette and the channel of a phialide, composed of concentric rings of wall layers. The layers form from the outer wall of each seceding conidium, except the first conidium. This wall ruptures at the level of the septum and does not participate further in conidial production. Rupture of the outer wall layer of the first conidium forms the collarette.

phialide - a conidiogenous cell which produces its first conidium holoblastically and subsequent conidia enteroblastically and basipetally. Secession of the first conidium leaves a collarette at the phialide apex and, at least in Ascochyta-like fungi, subsequent conidia, developing from the same fixed conidiogenous locus, leave behind wall layers which form a periclinal thickening.

phragmospore - a spore subdivided by two or more septa, all transverse; with a length:width ratio not exceeding 15:1 ; if elongated, with only a single axis, and that axis not curved through more than 180°; any protuberances, other than setulae, not more than ¼ the length of the spore body (Kendrick & Nag Raj, 1979).

polyphialide - a phialide with more than one conidiogenous locus.

proliferating phialide - a phialide which, after production of conidia from a fixed conidiogenous locus, proliferates percurrently to form a new fixed locus at a higher level.

pseudoparenchyma - a tissue which appears similar to plant parenchyma, but is composed of fungal hyphae which have lost their individuality and appear as more or less isodiametric cells joined both terminally and laterally; includes textura globulosa and textura angularis.

pseudopycnidial (conidiomal wall) - a delicate, thin, hyphal tissue surrounding a cavity, or part of a cavity formed after destruction of host cells by the fungus (Potebnia, 1910, p.65).

pseudostem - a hollow cylinder formed by the concentric leaf sheaths of a vegetative grass tiller.

pycnidial conidioma - a globose, flask-shaped, or longitudinal fructification with a wall of one to several layers of fungal cells, lined more or less entirely by a hymenium which produces conidia, and opening by an apical ostiole or sometimes by rupture.

pycnidium - see pycnidial conidioma.

pycnothyrial conidioma - a superficial, flattened, shield-shaped, hemispherical conidioma consisting sometimes of an upper wall only, but sometimes with a basal wall as well (Sutton, 1980).

rachilla - a branch, from the rachis of a grass flowerhead, on which the spikelets are borne.

rachis - that part of the culm which acts as the main axis of the flowerhead.

sheath - see leaf sheath.

spikelet - the true inflorescence of a grass, containing 1-15 flowers.

stroma - see eustroma.

teleomorph - the sexually reproductive, morphologically (and/or karyologically) differentiated organ of a fungus; the 'perfect state' in the sense of the Code (Art. 59) (De Vroey & Hennebert, in press).

textura - tissue structure of an apothecial or conidiomal wall (Korf, 1973, p.251, fig. 3).

textura angularis (conidiomal wall) - tightly packed, isodiametric cells without intercellular spaces.

textura globulosa (conidiomal wall) - globose cells with intercellular spaces.

textura intricata (conidiomal wall) - interwoven hyphae.

textura prismatica (conidiomal wall) - short-celled hyphae, with individual cells more or less brick-shaped.

tiller - the basic morphological unit of a grass plant; a branch originating from an axillary bud at the stem base, and characterised in the vegetative state by a contracted basal stem with short internodes. From the nodes arise adventitious roots and concentric leaf sheaths with expanded leaf blades. Further tillers develop in the axils of the leaf sheaths. A reproductive tiller produces, by internode elongation, a flowering stem, or culm, which bears the inflorescence.

verruculose - covered or marked with very small processes or warts.

PART ONE :

TAXONOMY OF ASCOCHYTULA, ASCOCHYTELLA, ASCOCHYTA AND RELATED FUNGI.