

APPENDIX

Keys

Key to the recognized true cercosporoid genera

- 1 Conidiogenous loci inconspicuous or subdenticulate, but always unthickened and not darkened or subconspicuous, i.e., unthickened, but somewhat refractive or rarely very slightly darkened, or only outer rim slightly darkened and refractive (visible as minuter rings).....*Pseudocercospora*
- 1 Conidiogenous loci conspicuous, i.e., thickened and darkened throughout, only with a minute central pore2
- 2 With verruculose superficial secondary mycelium; conidia amero- to scolecosporous, mostly verruculose*Stenella*
- 2 If superficial secondary mycelium present, hyphae smooth or almost so3
- 3 Conidia hyaline or subhyaline, scolecosporous, acicular, obclavate-cylindrical, filiform, usually pluriseptate*Cercospora*
- 3 Conidia pigmented or, if subhyaline, conidia non-scolecosporous, ellipsoid-ovoid, short cylindrical, fusoid and only few septa.....*Passalora*

Key to cercosporoid and morphologically similar genera

- 1 Conidiophores long, forming distinct synnemata2
- 1 Conidiophores or conidiogenous cells (i.e., conidiophores reduced to conidiogenous cells) solitary, arising from superficial hyphae, loosely to densely fasciculate or forming sporodochia8
- 2 Conidiogenous loci inconspicuous or subdenticulate, but neither thickened nor darkened, at most somewhat refractive.....*Pseudocercospora*
(Sect. *Pseudocercospora*)
- 2 Conidiogenous loci conspicuous, thickened or distinctly denticulate3
- 3 Conidiogenous loci non-geniculate, loci lying flat against the wall of the conidiogenous cells, non-protruding, unthickened, but somewhat darkened; conidia solitary*Phaeoisariopsis s.str.*
- 3 Conidiogenous loci conspicuously thickened and darkened or denticulate4
- 4 Synnemata with subhyaline to distinctly pigmented stipes; capitula pale to colourless; conidiogenous cells and conidia colourless; conidia solitary to catenate, 0-1(-3)-septate*Phacellium* Bonord.
- 4 Synnemata (incl. conidiogenous cells and conidia) pigmented5
- 5 Hyperparasitic on Meliolaceae and other tropical leaf-inhabiting ascomycetes; conidia often fairly thick-walled, septate and distoseptate*Spiropes* Cif.

- 5 Non-hyperparasitic, on leaves and other plant organs; conidia euseptate6
- 6 Conidia formed singly, scolecosporous, pluriseptate, verruculose to echinulate, partly with some longitudinal and oblique septa; conidiogenous loci often some what raised*Sclerographium* Berk.
- 6 Conidia catenate, non-scolecosporous, with few septa7
- 7 Synnemata with loose capitula; conidiogenous cells usually terminal, partly becoming intercalary, conspicuously sympodial; conidiogenous loci scattered*Passalora p.p. (Tandonella)*
- 7 Synnemata with fairly compact capitula; conidiogenous cells terminal and pleurogenous, conspicuously swollen, not conspicuously sympodial; conidiogenous loci densely aggregated, formed in irregular or almost synchronous sequence, broadly denticulate.....*Sclerographiopsis* Deighton
- 8(1) Conidiogenous cells holothallic or consistently monoblastic, determinate or percurrent, annellidic, conidiogenous loci neither thickened nor darkened9
- 8 Conidiogenous cells mono- to polyblastic or thalloblastic, sympodial; conidiogenous loci conspicuous, thickened, darkened, refractive, or inconspicuous, but in this case conidiogenous cells always sympodial or denticulate20
- 9 Hyphopodia present; stromata non; mycelium superficial; conidiophores solitary; conidia more or less scolecosporous, transversely pluriseptate*Clasterosporium* Schwein.

- 9 Hyphopodia absent10
- 10 Stromata substomatal; hyphae superficial, above stromata, radiating, forming sporodochium-like plates; conidiophores arising from the radiating hyphae, solitary, aggregated, especially near stomata; conidia adhering in fragile chains, 0-1-septate, mostly aseptate*Batcheloromyces* Marasas *et al.*
- 10 Mycelium and conidiomata different, and/or conidia solitary11
- 11 Stromata absent or almost so; mycelium internal and external, superficial; conidiophores solitary to loosely grouped, erumpent or arising from superficial hyphae; conidia solitary12
- 11 Stromata present, well-developed, mycelium internal; conidiophores densely aggregated, fasciculate, mostly forming sporodochia14
- 12 Secondary conidia formed on short annellate secondary conidiophores at apex of primary conidia*Anellophora* S. Hughes
- 12 Secondary conidiophores and conidia absent13
- 13 Hyphae, conidiophores and conidia pigmented; conidiogenous cells monoblastic, determinate to often percurrent, with annellations, growing on spermatophytes.....*Sporidesmium* Link. *S. lat.*
(subdivided into various genera by Subramanian, 1992)
- 13 All structures subhyaline (pale yellowish green); conidiogenous cells holothallic; muscicolous, sporogoniicolous*Episporogoniella* U. Braun
- 14(11) Conidiomata sporodochial; conidiogenous cells monoblastic, determinate; conidia dictyosporous*Dictyodesmium* S. Hughes

- 14 Conidiogenous cells percurrent, with annellations, and/or conidia only transversely septate15
- 15 Conidiomata sporodochial, elongated along leaf veins; conidia oft carrying parts of the conidiophores when detached*Oedothea* Syd.
- 15 Conidiomata not elongated along leaf veins; detached conidia without remnants of the conidiophores16
- 16 Mycelium immersed, often forming radiating hyphal plates; conidiophores arising from immersed stromata, scattered to fasciculate or even forming small sporodochia, conidia non-scolecosporous, amero- to phragmosporous (*Venturia* anamorphs).....*Fusicladium* Bonord. *p.p.* (*Pollaccia*, *Spilocea*)
- 16 Radiating hyphal plates lacking; conidiophores arranged in well-developed, large sporodochia or fasciculate; conidia scolecosporous17
- 17 Conidiophores and conidia thin-walled, smooth or almost so, annellations fine, mostly not very conspicuous; conidia scolecosporous, narrow, acicular-subcylindrical, filiform, narrowly obclavate, pluriseptate...*Pseudocercospora p.p.* (*Cercostigma*)
- 17 Conidiophores and conidia with somewhat thickened walls, often verruculose; annellations conspicuous, often coarse; conidia with transverse, longitudinal and oblique septa, shape variable, non-scolecosporous to scolecosporous, but wall somewhat thickened, and/or verruculose18
- 18 Conidia non-scolecosporous, distoseptate.....*Stigmia* Sacc.
- 18 Conidia euseptate19

19	Conidia scolecosporous, transversely euseptate; on leaves	<i>Scolecostigma</i> U. Braun
19	Conidia dictyosporous; on twigs	<i>Thyrostroma</i> Höhn.
20(8)	Conidial scars conspicuous, thickened, darkened, refractive.....	21
20	Conidial scars either inconspicuous or denticle-like (conidiogenous cells denticulate), but always unthickened and not darkened	42
21	Conidiophores long, composed of erect long stalks and more or less branched heads, usually strongly branched	22
21	Conidiophores simple or irregularly branched, not separated into stalks and heads	23
22	Conidia 0-pluriseptate, septa transverse.....	<i>Periconiella</i> Sacc.
22	Conidia pluriseptate, dictyosporous.....	<i>Mystrosporiella</i> Munjal and Kulshr.
23	Conidiogenous loci protuberant, coronate, i.e., with a central convex part (dome) surrounded by a raised periclinal rim; conidia in long, often branched chains, smooth to verruculose (subgen. <i>Cladosporium</i>) or usually solitary, verrucose-echinulate (subgen. <i>Heterosporium</i>)	<i>Cladosporium</i>
23	Conidiogenous loci non-coronate	24
24	Conidiophores solitary or in small to rich fascicles, laxly erect, very long, frequently irregularly branched	25
24	Conidiophores simple, rarely branched and/or with superficial secondary mycelium	26

- 25 Conidiogenous cells barely geniculate; conidiogenous loci crowded, papilla-like, protruding, refractive, but not darkened, wall unthickened; on vascular plants*Pseudocercosporidium* Deighton
- 25 Conidiogenous cells geniculate, denticulate, denticles unthickened, but somewhat darkened or refractive, more or less scattered; hyperparasitic on ascomycetes*Elletevera* Deighton
- 26(24) Conidiomata sporodochia, pulvinate, punctiform; stromata present, with a single or several swollen erumpent cells which give rise to two or more mostly curved conidiophores, not or barely geniculate; conidia ellipsoid-cylindrical to obclavate, distoseptate*Camptomeris* Syd.
- 26 Conidiophores arising from hyphae or stromata, but not two or more from vesicle-like cells, conidia euseptate (if distoseptate, conidiomata quite distinct)27
- 27 Stromata subcuticular (-intraepidermal), membranous; conidiophores solitary to crowded, erumpent, straight to later usually curved, wall often unequally thickened; conidiogenous cells monoblastic, determinate (-percurrent), loci broad, flat, dark; conidia solitary, 1-septate, broad (ca. 6-14 μm)*Fusicladiella* Höhn.
- 27 Conidiogenous cells polyblastic; shape of conidiophores and loci different...28
- 28 With internal primary and external secondary mycelium; secondary hyphae creeping or climbing leaf hairs29
- 28 Mycelium only internal, superficial hyphae absent.....33

- 29 Hyperparasitic on ascomycetes or on leaf spots caused by other fungi or on rust30
- 29 Non-hyperparasitic, on green parts of vascular plants.....31
- 30 Conidiogenous cells more or less conspicuously sympodial, geniculate; conidia catenate, often in branched chains, aseptate to pluriseptate*Cladosporiella* Deighton
- 30 Conidiogenous cells not conspicuously sympodial, non-geniculate; conidiogenous loci lying more or less flat against the side of the conidiogenous cell, unthickened, but somewhat darkened-refractive; conidia formed singly, scolecosporous*Eriocercospora* Deighton
- 31 Superficial hyphae characteristically verruculose; conidiogenous loci minute, slightly thickened and darkened; conidia variable, solitary to catenate, amerosporous to scolecosporous, mostly verruculose*Stenella*
- 31 Superficial hyphae smooth (light microscopy, oil immersion)32
- 32 Conidia scolecosporous, solitary, with transverse and often longitudinal septa, fairly thick-walled, often with constrictions at the septa.....*Strosporium* Bubák and Serebr.
- 32 Conidia variable, solitary or catenate, amerosporous to scolecosporous, only transversely septate, thin-walled*Passalora p.p. (Mycovellosiella)*
- 33(28) Conidia hyaline or subhyaline34
- 33 Conidia pigmented35
- 34 Conidia scolecosporous, usually pluriseptate*Cercospora*

- 34 Conidia amero- to phragmosporous, aseptate or only with few septa.....*Passalora p.p.*
- 35(33) Conidiogenous loci denticle-like, unthickened, but somewhat darkened-refractive; conidia non-scolecosporous.....*Fusicladium* Bonord. *p.p.*
- 35 Conidiogenous loci non-denticulate thickened and darkened throughout or at least around the rim.....36
- 36 Conidiogenous loci subconspicuous, either only ultimate rim slightly thickened and darkened, conidia solitary [see *Pseudocercospora p.p.* (*Paracercospora*)] or conidia catenate, loci unthickened, but slightly darkened-refractive [see *Pseudocercospora p.p.* (*Pseudophaeoramularia*)]
- 36 Conidiogenous loci conspicuously thickened throughout, only with a minute central pore37
- 37 Conidia distoseptate*Distocercospora* N. Pons and B. Sutton
- 37 Conidia euseptate38
- 38 Conidia coarsely verruculose to echinulate39
- 38 Conidia smooth or only faintly rough-walled.....41
- 39 Conidia non-scolecosporous, ellipsoid-ovoid, short subcylindrical, aseptate or only with few septa*Asperisporium* Maubl.
- 39 Conidia scolecosporous40
- 40 Stromata rudimentary or prosenchymatic; conidiogenous loci non-protuberant*Stenellopsis* B. Huguenin
- 40 Stromata well-developed, pseudoparenchymatic; conidiogenous loci somewhat protuberant*Verrucisporota* D. E. Shaw and Alcorn

- 41 Conidia obclavate, more or less rostrate, pluriseptate, wall and septa fairly thick-walled and dark*Prathigada* Subram.
- 41 Conidia non-scolecosporous or, if scolecosporous, non-rostrate, thin-walled*Passalora*
- 42(20) Conidiophores subhyaline to pale olivaceous; conidiogenous loci broad, flat, thin; conidia septate, basal and terminal cells hyaline or subhyaline, cells in the middle more or less pigmented, terminal cells with filiform appendages*Pleiochaeta* (Sacc.) S. Hughes
- 42 Conidia without appendages or only occasionally with a basal appendages.....43
- 43 Conidiophores hyaline to pale brown; conidiogenousm loci broad, flat unthickened or very lightly thickened throughout; conidia large, long and in diameter, hyaline to pale brown, with a narrow terminal beak, often with foot-shaped extensions near the base*Mycocentrospora* Dighton
- 43 Conidia without beak and foot-shaped basal extensions.....44
- 44 Conidiogenesis holothallic and thalloblastic (i.e., the conidiogenous loci and conidium initials have about the same width); conidia in disarticulating chains; conidiophores and conidia colourless or only very pale....*Theadgonia* B. Sutton
- 44 Conidiogenesis holoblastic (i.e., conidium initials narrower than the conidiogenous cells); conidia solitary or in 'normal' acropetal chains45

- 45 Superficial hyphae, conidiophores and conidia verruculose; conidiogenous cells terminal and intercalary; conidia solitary, septate.....*Parastenella* David
- 45 All structures smooth, at most faintly rough-walled46
- 46 Mycelium internal and external; conidiophores much branched; conidiophores terminal, intercalary and pleurogenous, formed as nodulose swellings or lateral branchlets, non-sympodial, swollen parts or tips with numerous, crowded small denticles; conidia solitary, septate.....*Gonatophragmium* Dighton
- 46 Conidiophores unbranched or only sparingly branched; conidiogenous cells terminal or occasionally intercalary, but not swollen.....47
- 47 Conidiophores long; conidiogenous cells terminal, non-geniculate (elongation not typically sympodial), distinctly denticulate; conidia solitary, 1-3-septate, non-scolecosporous.....*Semipseudocercospora* J. M. Yen
- 47 Conidiogenous cells sympodial, often distinctly geniculate, non- or only subdenticulate; conidia scolecosporous or, if not so, in chains.....48
- 48 Conidiogenous cells subdenticulate; conidia in simple or branched chains, non-scolecosporous, ellipsoid-ovoid, cylindrical, 0-1(-3)-septate...*Denticularia* Deighton
- 48 Conidia solitary, occasionally in short chains (but then conidiogenous cells non-denticulate), usually scolecosporous and pluriseptate....*Pseudocercospora*



ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright © by Chiang Mai University
All rights reserved

CURRICULUM VITAE

Personal Information

Name: Miss Jamjan Meeboon
Birth Date: April 22, 1981
Birth Place: Chiang Rai
Nationality: Thai
Family Status: Single
Address: 18 Moo 11 Tambon Wiang Ga Long
Amphoe Wiang Pa Pao
Chiang Rai 57260, Thailand

Education:

Primary School:

(1996) Wiang Pa Pao Wittayakom School, Chiang Rai

Secondary School:

(1997-1999) Yupparaj Wittayalai School, Chiang Mai

University:

(2000-2003) Bachelor of Science in Plant Pathology,
Agriculture Faculty, Chiang Mai University