Neth. J. Pl. Path. 86 (1980) 199–228

Check-list for scientific names of common parasitic fungi. Series 2d: Fungi on field crops: vegetables and cruciferous crops

G. H. BOEREMA and ADRIANA A. VERHOEVEN

Plant Protection Service (PD), Wageningen, the Netherlands

Accepted 3 April 1980

Abstract
This list is a continuation of Series 2a, b, and c [Neth. J. Pl. Path. 82 (1976) 193–214, 83 (1977) 165–204 and 85 (1979) 151–185], an account of the nomenclature of common parasitic fungi on field crops as used in official publications of the Netherlands Society of Plant Pathology and the Netherlands Ministry of Agriculture and Fisheries.

Introduction

The preceeding parts of Series 2 of this check-list[1] deal with the scientific names of common parasitic fungi on the field crops: beet, potato, caraway, flax and oilseed poppy (Ser. 2a – Boerema and Verhoeven, 1976); barley, maize, oat, rye, wheat and cultivated grasses (Ser. 2b – Boerema and Verhoeven, 1977): dwarf beans, field (broad) beans, peas, yellow trefoil, clovers, lucernes, lupins, serradella and vetches (Ser. 2c – Boerema and Verhoeven, 1979).

In the present publication, Series 2d, an account is given of the nomenclature of parasitic fungi on vegetables and cultivated cruciferous plants grown in the Netherlands as field crops. The hosts include:

carrot	(*Daucus carota* subsp. *sativus* (Hoffm.) Arcang.)
celeriac or turnip-rooted celery	(*Apium graveolens* var. *rapaceum* (Mill.) DC.)
chicory or witloof	(*Cichorium intybus* L.)
leek	(*Allium porrum* L.)
onion	(*Allium cepa* L.)
spinach	(*Spinacia oleracea* L.)

[1] The scientific names of common parasitic fungi on trees and shrubs were treated in Series 1 (Boerema and Verhoeven, 1972, 1973).

Brussels sprout(s)	(*Brassica oleracea* var. *gemmifera* (DC.) Schultz)
kale	(*Brassica oleracea* var. *acephala* DC.)
common kale or curled borecole	(subvar. *laciniata* L.)
marrow-stem kale	(subvar. *acephala*)
mustard	
black mustard	(*Brassica nigra* (L.) Koch)
white mustard	(*Sinapis alba* L.)
radish	(*Raphanus sativus* L.)
fodder radish	(subsp. *oleiferus* (DC.) Metzg.)
rape	(*Brassica napus* L.)
fodder or forage rape	(variety of subsp. *oleifera* (Metzg.) Sinsk.)
oil-seed rape or coleseed	(variety of subsp. *oleifera* (Metzg.) Sinsk.)
swede or rutabaga (Am.)	(*Brassica napus* subsp. *napus* var. *napobrassica* (L.) Rchb.)
turnip	(*Brassica rapa* L.)
summer turnip-rape	(var. *silvestris* (Lam.) Briggs)

The fungi have again been selected in agreement with the Committee for Dutch Names of Plant Diseases ('Commissie voor Nederlandse namen van Planteziekten') of the Netherlands Society of Plant Pathology. The recognized scientific names should be used in the official publications of the Netherlands Society of Plant Pathology[2] and the Netherlands Ministry of Agriculture and Fisheries.

An explanation of the various symbols and abbreviations was included in the first paper of this Series (Boerema and Verhoeven, 1976). References in that paper to Articles of the 'Seattle Code' may also be read as references to the same Articles of the recently published 'Leningrad Code' (Stafleu et al., 1978).

Samenvatting

Verantwoording van de wetenschappelijke namen van algemeen voorkomende parasitaire schimmels.
Serie 2d: Schimmels bij akkerbouwgewassen: groenten en kruisbloemige handels-, voeder- en groenbemestingsgewassen

In alfabetische volgorde wordt de nomenclatuur behandeld van de parasitaire schimmels bij de op landbouwbedrijven geteelde groenten: prei, spinazie, ui, wortel, witlof, boerenkool en spruitkool. De parasitaire schimmels van de twee laatstgenoemde kruisbloemigen komen eveneens voor op de landbouwgewassen: bladkool, koolraap, koolzaad, mergkool en stoppelknol, alsmede bladramenas en bruine (zwarte) en gele mosterd. De geselecteerde namen zullen worden gebruikt in de officiële publikaties van de Nederlandse Planteziektenkundige Vereniging en het Ministerie van Landbouw en Visserij.

[2] See e.g. the recently published list of Dutch names of diseases of agricultural crops (Gewasbescherming 10 (1), 1979).

References

Boerema, G. H. & Verhoeven, A. A., 1972. Check-list for scientific names of common parasitic fungi. Series 1a: Fungi on trees and shrubs. Neth. J. Pl. Path. 78, Suppl. 1, 63 pp.

Boerema, G. H. & Verhoeven, A. A., 1973. Check-list for scientific names of common parasitic fungi. Series 1b: Fungi on trees and shrubs; additions. Neth. J. Pl. Path. 79: 165–179.

Boerema, G. H. & Verhoeven, A. A., 1976. Check-list for scientific names of common parasitic fungi. Series 2a: Fungi on field crops: beet and potato; caraway, flax and oilseed poppy. Neth. J. Pl. Path. 82: 193–214.

Boerema, G. H. & Verhoeven, A. A., 1977. Check-list for scientific names of common parasitic fungi. Series 2b: Fungi on field crops: cereals and grasses. Neth. J. Pl. Path. 83: 165–204.

Boerema, G. H. & Verhoeven, A. A., 1979. Check-list for scientific names of common parasitic fungi. Series 2c: Fungi on field crops: pulse (legumes) and forage crops (herbage legumes). Neth. J. Pl. Path. 85: 151–185.

Stafleu, F. A., Demoulin, V., Greuter, W., Hiepko, P., Linczevski, I. A., McVaugh, R., Meikle, R. D., Rollins, R. C., Ross, R., Schopf, J. M. & Voss, E. G., 1978. International Code of Botanical Nomenclature adopted by the twelfth International Botanical Congress, Leningrad, July 1975. Regnum veg. 97, 457 pp.

Address

Plantenziektenkundige Dienst, Geertjesweg 15, P.O. Box 9102, 6700 HC Wageningen, the Netherlands.

ALBUGO CANDIDA (Pers. ex Hook.) O. Kuntze

Albugo candida (Pers. ex Hook.) O. Kuntze. Rev. Gen. Pl. **2**: 658. 1891.

rn ≡ *Uredo candida* (Pers.) Pers. ex Hooker, Fl. scot. **2**: 15. 1821.
: Fries, Syst. mycol. **3** [Sect. 2]: 515. 1832.

dn ≡ *Uredo candida* (Pers.) Persoon, Syn. meth. Fung. 223. 1801.

dn ≡ *Aecidium candidum* Persoon in J. F. Gmelin, Car. Linn. Syst. Nat., ed. 13, **2**: 1473. 1791.

≡ *Cystopus candidus* (Pers. ex Hook.) Léveillé *in* Annls Sci. nat. (Bot.) III, **8**: 371. 1847.

= *Albugo cruciferarum* S. F. Gray, Nat. Arr. Br. Pl. **1**: 540. 1821.

Note: This species is known as the causal organism of White Blister (Am.: White Rust) of crucifers, although it is also recorded on plants of other families. All the cruciferous field crops mentioned in the introduction of this check-list may serve as hosts. *A. candida* is certainly a complex species embracing numerous specialized forms, which in part show slight morphological differences, see e.g. the discussion by Pound & Williams *in* Phytopathology **53**: 1146–1149. 1963 and Jörstad *in* Nytt Mag. Bot. **11**: 50–54. 1964. This explains that within the species various varieties, forms, formae speciales and biological races have been distinguished, but no agreement has been reached on this point. In check-list 1a [*in* Neth. J. Pl. Path. **78**, Suppl. 1: 5. 1972] the basionym of *A. candida* is ascribed to J. F. Gmelin (l.c.), however, it appears that Gmelin was only the publishing author of *Aecidium candidum* Persoon. In recent literature the fungus is often indicated with its synonym *Albugo cruciferarum* S. F. Gray (l.c.), but the epithet '*candida*' used by Fries in the starting-point book is conserved against '*cruciferarum*'. Information concerning the confusing use of the names *Albugo* and *Cystopus*, as was formerly the case, may be found in Whipps & Cooke *in* Trans. Br. mycol. Soc. **70**: 285–287. 1978. For description and literature references on the taxonomy and biology of *A. candida* see Mukerji *in* C. M. I. Descr. pathog. Fungi Bact. 460. 1975. See also Butler & Jones, Pl. Path. 635–637. 1949 [under *Cystopus candidus*]. The fungus is frequently accompanied by the downy mildew *Peronospora parasitica* (Pers. ex Pers.) Fr. (q.v.).

ALTERNARIA BRASSICAE (Berk.) Sacc.

Alternaria brassicae (Berk.) Saccardo *in* Michelia **2** (1): 197. 1880 [as '(Berk.) Sacc. **minor*'; see note]; *in* Syll. Fung. **4**: 546. 1886 [misapplied; see note].

≡ *Macrosporium brassicae* Berkeley *in* [Sm.] Engl. Flora **5** (2): 339. 1836.

H ≡ *Alternaria brassicae* (Berk.) Bolle *in* Meded. phytopath. Lab. Willie Commelin Scholten **7**: 27. 1924 ['nec. Sacc.'; see note].

= *Alternaria brassicae* var. *macrospora* Saccardo *in* Syll. Fung. **4**: 546. 1886.

Note: *A. brassicae* and *A. brassicicola* (Schw.) Wiltsh. (listed below) produce circular, zonate spots on the leaves of cruciferous crops, especially *Brassica* spp. This disease is called Dark Leaf Spot, but an attack by *A. brassicae* is also known as Grey or Light Leaf Spot to differentiate it from the almost black spots caused by *A. brassicicola*. Both seed-borne species are microscopically easy to distinguish: the conidia of *A. brassicae* are large, and provided with a beak; those of *A. brassicicola* are smaller and unbeaked. Wiltshire, *in* Mycol. Pap. **20**: 1–8. 1949, pointed out that

Saccardo's descriptions under the combination *A. brassicae* (Berk.) Sacc. (l.c.) refer to the small-spored ['*minor*'] species, although the basionym, Berkeley's *Macrosporium brassicae*, concerns the large-spored species [Saccardo's var. *macrospora*]. This is the reason that Bolle (l.c.) published the homonym *A. brassicae* (Berk.) Bolle with the correct description. However, according to Art. 55, the combination *A. brassicae* (Berk.) Sacc. must stand and be applied to Berkeley's fungus. Other synonyms can be found in Neergaard, Danish Alternaria and Stemphylium 218–230. 1945; Wiltshire l.c. and Joly *in* Encycl. mycol. **33**: 135–138. 1964. For descriptions, hosts, disease symptoms and distribution see Neergaard l.c.; Joly l.c.; Ellis *in* C. M. I. Descr. pathog. Fungi Bact. 162. 1968 and Ellis, Dematiac. Hyphom. 482. 1971. Methods for testing seed infection are described in Handb. Seed Health Testing [Ed. Int. Seed Test. Ass.] III, Working Sheet 29. 1964. Seed infection may result in Damping-off, see Neergaard l.c.

ALTERNARIA BRASSICICOLA (Schw.) Wiltsh.

Alternaria brassicicola (Schw.) Wiltshire *in* Mycol. Pap. **20**: 8, 10. 1947.

V ≡ *Helminthosporium brassicicola* Schweinitz *in* Trans. Am. phil. Soc. II, **4** [= Syn. Fung. Am. bor.]: 279. 1832 ["1834"] [as '*brassicola*'].

= *Alternaria circinans* (Berk. & Curt.) Bolle *in* Meded. phytopath. Lab. Willie Commelin Scholten **7**: 26. 1924.

≡ *Macrosporium cheiranthi* var. *circinans* Berkeley & Curtis *in* Grevillea **3**: 105. 1875.

= *Alternaria oleracea* Milbrath *in* Bot. Gaz. **74**: 320. 1922.

Note: *A. brassicicola* is the common causal organism of Dark Leaf Spot of cruciferous crops, especially *Brassica* spp. In older literature it is often confused with *A. brassicae* (Berk.) Sacc. (q.v.), although both seed-borne species can easily be distinguished microscopically. The leaf spots caused by *A. brassicicola* are usually darker than those of *A. brassicae*. The fungus produces streaks and spots on the stem and cotyledons of seedlings, and sometimes symptoms of Damping-off. For descriptions, complete synonymy, hosts, disease symptoms and distribution see Wiltshire l.c., Neergaard, Danish Alternaria and Stemphylium 129–148. 1945 [under *A. circinans*]; Joly *in* Encycl. mycol. **33**: 174–179. 1964 [under *A. oleracea*]; Ellis *in* C. M. I. Descr. pathog. Fungi Bact. 163. 1968 and Ellis, Dematiac. Hyphom. 467–468. 1971. Methods for testing seed infection can be found in Handb. Seed Health Testing [Ed. Int. Seed Test. Ass.] III, Working Sheet 28. 1964.

ALTERNARIA DAUCI (Kühn) Groves & Skolko

Alternaria dauci (Kühn) Groves & Skolko *in* Can. J. Res., Sect. C., **22**: 222. 1944.

≡ *Sporidesmium exitiosum* var. *dauci* Kühn *in* Hedwigia **1**: 91. 1855; *in* Klotzschii Herb. mycol.. ed. 2 [Ed. Rabenh.] Cent. 2 No. 182. 1855.

≡ *Alternaria porri* (Ell.) Cif. f. sp. *dauci* (Kühn) Neergaard, Danish Alternaria and Stemphylium 252, 560. 1945.

= *Alternaria carotae* (Ell. & Langl.) Stevenson & Wellman *in* J. Wash. Acad. Sci. **34**: 263. 1944.

≡ *Macrosporium carotae* Ellis & Langlois *in* J. Mycol. **6**: 36. 1890.

Note: This fungus is particularly well known as the causal organism of Leaf Blight of carrots, but it may also attack celeriac and other Umbelliferae (cf. Joly *in* Encycl. mycol. **33**: 180. 1964). When large numbers of spots occur, the foliage appears scorched. The fungus can survive in infected plant debris and can be carried in the seed, see Neergaard l.c.: 258 and Maude *in* Ann. appl. Biol. **57**: 83–93. 1966 (Damping-off of seedlings). *A. dauci* has much in common with *A. porri* (Ell.) Cif. (q.v.; Purple Blotch of leek and onion), for example the production of conspicuous pigments which are red or yellow depending on the acidity of the substratum. Both fungi can be distinguished by the morphology and dimensions of the long beaked conidia, see e.g. the descriptions and illustrations in Ellis, Dematiac. Hyphom. 485–486 [*A. porri*] and 489–491 [*A. dauci*]. 1971. For complete synonymy of *A. dauci*, its characteristics in culture, disease symptoms and other phytopathological data see Neergaard l.c.: 249–250, 252–259. Methods for testing seed infection can be found *in* Handb. Seed Health Testing [Ed. Int. Seed Test. Ass.] III, Working Sheet 4. 1964.

ALTERNARIA PORRI (Ell.) Cif.

Alternaria porri (Ell.) Ciferri *in* J. Dep. Agric. P. Rico **14**: 30. 1930.

≡ *Macrosporium porri* Ellis *in* Grevillea **8**: 12. 1879.

H ≡ *Alternaria porri* (Ell.) Sawada *in* Rep. Govt Res. Inst. Dep. Agric. Formosa **61**: 92. 1933.

H ≡ *Alternaria porri* (Ell.) Neergaard *in* Årsberetn. J.E. Ohlsens Enkes plpatol. Lab. **1937–38** [= **3**]: 5. 1938; Dan. Alternaria and Stemphylium 233–252. 1945.

≡ *Alternaria dauci* f. sp. *porri* (Ell.) Neergaard ex Joly *in* Encycl. mycol. **33**: 182. 1964 [this nomenclature was suggested by Neergaard, Dan. Alternaria and Stemphylium 234. 1945 in anticipation of possible future acceptance of his proposal to use for a species and other taxa always the earliest name without consideration of the rank; compare Art. 34 and 60].

= *Alternaria allii* Nolla *in* Phytopathology **17**: 118. 1927.

Note : *A. porri* causes leaf spots on various *Allium* spp., including leek and onion: Purple Blotch. The first symptoms are small white fleck lesions, which under wet conditions develop into large elliptical purplish spots. The infection can spread to the underground parts of the host plants causing a yellow to reddish watery rot. The fungus is usually carried over from season to season in crop debris, but is also seed-borne, see Neergaard 1945 l.c.: 251 (Damping-off of seedlings). For descriptions of the typical long beaked conidia of *A. porri* see Ellis & Holliday *in* C.M.I. Descr. pathog. Fungi Bact. 248. 1970 and Ellis, Dematiac. Hyphom. 486. 1971. The fungus produces, just like the related *A. dauci* (Kühn) Groves & Skolko (q.v; Leaf Blight of carrots and other Umbelliferae), in vitro typical pigments which are red or yellow depending on the acidity of the substratum, see Neergaard 1945 l.c.: 249–250. Both fungi have been treated as only specialized pathogenic forms of one collective species, but they can be differentiated by the morphology and dimensions of the conidia, see Ellis l.c.: 485–486 [*A. porri*] and 489–491 [*A. dauci*]. References to phytopathological literature on purple blotch are given by Ellis & Holliday l.c.

ALTERNARIA RADICINA Meier & al.

Alternaria radicina Meier, Drechsler & Eddy *in* Phytopathology **12**: 157–166. 1922.

≡ *Thyrospora radicina* (Meier & al.) Neergaard *in* Bot. Tidsskr. **44**: 361. 1938.

≡ *Stemphylium radicinum* (Meier & al.) Neergaard *in* Årsberetn. J. E. Ohlsens Enkes plpatol. Lab. **4**: 3. 1939.

≡ *Pseudostemphylium radicinum* (Meier & al.) Subramanian *in* Curr. Sci. **30**: 423. 1961.

Note: *A. radicina* causes a Black Rot of carrots, especially in storage. It may also cause Damping-off of carrot seedlings, see Maude *in* Ann. appl. Biol. **57**: 83–93. 1966 under *Stemphylium radicinum*, but this phase is not as severe as that caused by *Alternaria dauci* (Kühn) Groves & Skolko (q.v.). The fungus is seed- and soil-borne and has occasionally been recorded on other cultivated Umbelliferae. Neergaard *in* Beretn. nord. JordbrForsk. Foren. Kongr. [contained *in* Nord. JordbrForsk. **17/18**] **1935**: 78–84. 1935 has described it as the cause of Damping-off of celeriac seedlings and of 'Scab'-like symptoms on the turnip-like crown of celeriac, resembling an attack by *Phoma apiicola* Kleb. (q.v.). There has been much discussion about the generic position of the fungus, but Simmons *in* Mycologia **59**: 90. 1967 has pointed out that the sporulation characteristics of this species are fundamentally alternarioid and that the species originally was correctly included in *Alternaria* Nees ex Fr. For descriptions, disease symptoms and other phytopathological data see Neergaard, Dan. Alternaria and Stemphylium 335–361. 1945 [under *Stemphylium radicinum*] and Ellis & Holliday *in* C.M.I. Descr. pathog. Fungi Bact. 346. 1972. See also Joly *in* Encycl. mycol. **33**: 122–123. 1964 and Ellis, Dematiac. Hyphom. 470–472. 1971.

ALTERNARIA RAPHANI Groves & Skolko

Alternaria raphani Groves & Skolko *in* Can. J. Res., Sect. C. **22**: 227. 1944.

= *Alternaria matthiolae* Neergaard, Dan. Alternaria and Stemphylium 177. 1945.

Note: This fungus is mostly involved in the Alternaria Leaf Spot of fodder radish; secondarily *A. brassicae* (Berk.) Sacc. (q.v.) and *A. brassicicola* (Schw.) Wiltsh. (q.v.) may also occur. *A. raphani* is seed-borne [Groves & Skolko l.c. have described the fungus as a parasite of the seedpods of radish] and has also been recorded from various other Cruciferae [Neergaard's binomial refers to its common occurrence on the garden stock]. The fungus may produce typical symptoms of Damping-off on seedlings. For descriptions of *A. raphani* see Groves & Skolko l.c.; Neergaard l.c. and Ellis, Dematiac. Hyphom. 474. 1971. Joly *in* Encycl. mycol. **33**: 171–172. 1964 states that *A. raphani* is conspecific with *A. japonica* Yoshii, previously described from *Brassica* and radish in Japan [*in* J. Pl. Prot., Tokyo **28**: 17. 1941], but this has not yet been confirmed by any other worker on this group of fungi.

BOTRYOTINIA SQUAMOSA Vienn.-Bourg.

Botryotinia squamosa Viennot-Bourgin *in* Annls Épiphyt. **4**: 36. 1953.

≡ *Sclerotinia squamosa* (Vienn.-Bourg.) Dennis *in* Mycol. Pap. **62**: 157. 1956.

stat. con. *BOTRYTIS SQUAMOSA* J. C. Walker

Botrytis squamosa J. C. Walker *in* Phytopathology **15**: 710. 1925.

Note: *Botryotinia squamosa* is most important as the cause of Leaf Rot (Am.: Leaf Blight) of onion, but it may also cause a Neck Rot of onion bulbs resembling an infection by *Botrytis aclada* Fres. (q.v.; syn. *B. allii* Munn). A detailed description of the different phases of the disease [blast, blight, neck rot] is given by Hennebert *in* Parasitica **20**: 144–146 [138–153]. 1964. The perfect state of this pathogen, which was until recently only known from studies in culture, has been recorded occurring naturally in the U.S.A., see Ellerbrock, Lorbeer & Loparco *in* Proc. Am. phytopath. Soc. **2**: 96–97. 1975 and Ellerbrock & Lorbeer *in* Phytopathology **67**: 363–372 [368]. 1977. For descriptions of both states of the fungus, the cultural characteristics and the development of sclerotia and microconidia (*Myrioconium* sp.) see Hennebert l.c. Characters used in the differentiation from other species of *Botryotinia* and *Botrytis* recorded on *Allium* spp. are discussed by Hennebert *in* Meded. Landb-Hogesch. OpzoekStns Gent **28**: 851–876. 1963. See also Ellis, Dematiac. Hyphom. 179–181. 1971. The sources of primary inoculum and the survival of sclerotia and conidia have been studied by Ellerbrock & Lorbeer l.c. 219–225, 363–372.

BOTRYTIS ACLADA Fres.

Botrytis aclada Fresenius, Beitr. Mykol. [**1**] 16. 1850.

= *Botrytis allii* Munn *in* Bull. N. Y. St. agric. Exp. Stn **437**: 396. 1917.

Note: This principal causal organism of Neck Rot of onion bulbs [see also under *Botryotinia squamosa* Vienn.-Bourg.] is generally known as *Botrytis allii*, but Hennebert *in* Persoonia **7** (2): 189. 1973 concluded that *B. allii* is conspecific with the earlier described *B. aclada*. Compare the discussion of this pathogen by Hennebert *in* Meded. LandbHogesch. OpzoekStns Gent **28**: 853–857. 1963. The fungus has also been recorded on other species of *Allium*, see e.g. the observations and literature references mentioned by Hennebert 1963 l.c. Infected seeds have been shown to be a major source of *B. aclada* in the onion crops, see Maude & Presly *in* Ann. appl. Biol. **86**: 163–180 and 181–188. 1977. The fungus invades the leaves of plants without causing symptoms, producing conidiophores only after the leaf tissue senesces. Apart from attacks of the necks of the onions, infections may also occur at the base of the bulbs and via wounds. A detailed description of the disease symptoms on onions at harvest and in storage is given by Butler & Jones, Pl. Path. 706–710. 1949. For the microscopical characteristics of the fungus in vivo and in vitro see also Butler & Jones l.c. and Rφed *in* Acta Agric. scand. **1** (1): 25–33. 1950. Microconidia (spermatia) have not been recorded for *B. aclada* and no perfect state is known. Information concerning the characters used in differentiating from other species of *Botrytis* recorded on *Allium* spp. can be found in Hennebert 1963 l.c. and Ellis, Dematiac. Hyphom. 179–181. 1971. Differential resistance to *B. aclada* occurs, see e.g. van der Meer, van Bennekom & van der Giessen *in* Euphytica **19**: 152–162. 1970. For other phytopathological data see Butler & Jones l.c. and Ellis & Waller *in* C.M.I. Descr. pathog. Fungi Bact. 433. 1974.

BOTRYTIS CINEREA Pers. ex Nocca & Balb.

rn *Botrytis cinerea* Pers. ex Nocca & Balbis, Fl. Ticinensis **2**: 367. 1821; Persoon, Mycol. eur. **1**: 32. 1822.

: Fries, Syst. mycol. **3** [Sect. 2]: 396–397. 1832.

dn ≡ *Botrytis cinerea* Persoon, Syn. meth. Fung. 690. 1801.

Note: This ubiquitous Grey Mould represents the most variable conidial state of a series of distinct *Botryotinia* species related to *B. fuckeliana* (de Bary) Whetzel [syn. *Sclerotinia fuckeliana* (de Bary) Fuckel]. Under suitably humid conditions *Botrytis cinerea* may attack various field crops including those treated in this paper; compare check-list 2a and 2c [*in* Neth. J. Pl. Path. **82**: 198. 1976 and **85**: 156. 1979]. Peterson *in* Mycotaxon **2**: 159 (151–165). 1975 pointed out that the name *B. cinerea* Pers. was first revalidated by Nocca & Balbis l.c., therefore the correct author citation is 'Pers. ex Nocca & Balb.' and not 'Pers. ex Fr.' or 'Pers. ex Pers.' as commonly found in literature. A recent review of the extensive literature on *B. cinerea* is given by Domsch, Gams & Anderson, Compendium Soil Fungi 150. 1980. See also the guide to the literature on taxonomy, physiology and pathogenicity of *Botryotinia* and *Botrytis* species by Jarvis *in* Monogr. Res. Brch Can. Dep. Agric. **15** (195 pp.). 1977. For descriptions and illustrations of *B. cinerea* see Ellis, Dematiac. Hyphom. 179–180. 1971 and Ellis & Waller *in* C.M.I. Descr. pathog. Fungi Bact. 431. 1974 [under *Sclerotinia fuckeliana*]. The occurrence of a microconidial (spermatial) state (*Myrioconium* sp.) is reported by Brierley *in* Bull. misc. Inf. R. bot. Gdns Kew **1918** [**4**]: 129–146. 1918; see also Jarvis l.c.

CLADOSPORIUM VARIABILE (Cooke) de Vries

Cladosporium variabile (Cooke) de Vries, Contrib. Knowl. Cladosporium 85. 1952.

≡ *Heterosporium variabile* Cooke *in* Fungi Br. exs. No. 360. 1870; *in* Grevillea **5**: 123. 1877.

Note: *C. variabile* causes small whitish water-soaked spots on spinach: Leaf Spot. In a later stage the spots often coalesce and become dark due to the fruiting of the fungus (Am.: Leaf Mold). For descriptions of this seed-borne disease see Glasscock & Ware *in* Gdnrs' Chron. **106**: 100–102. 1939 and Moore *in* Trans. Br. mycol. Soc. **28**: 129–130. 1945 [under *Heterosporium variabile*]. Detailed descriptions of this very variable fungus in vivo and in vitro are given by de Vries l.c.: 85–89 and Gambogi *in* Agricoltura ital., Pisa **60** [= II, **15**]: 385–414. 1960. See also Mathur, Mathur & Sehgal *in* Indian Phytopath. **12** [**1959**]: 161–163. 1960 and Ellis, Dematiac. Hyphom. 314–315. 1971.

COLLETOTRICHUM DEMATIUM f. *SPINACIAE* (Ell. & Halst.) von Arx

Colletotrichum dematium f. *spinaciae* (Ell. & Halst.) von Arx *in* Phytopath. Z. **29**: 460. 1957.

≡ *Colletotrichum spinaciae* Ellis & Halsted *in* J. Mycol. **6**: 34. 1890.

Note: This causal organism of spots on leaves, petioles and stems of spinach: Anthracnose, shows much resemblance with the saprophytic *C. dematium* (Pers. ex Fr.) Grove. Differentiation of the spinach pathogen is nevertheless possible by the uniform cultural appearance and the dimensions of the conidia [mostly 22–24 × 3–3.5 µm]. Therefore von Arx's (l.c.) classification of this pathogen as a 'forma' of *C. dematium* has the preference over 'forma specialis', which should mean that differentiation is only possible by pathogenicity tests [in the literature f. *spinaciae* is often interpreted as 'f. sp. *spinaciae*']. For the morphological and physiological characteristics of the fungus see e.g. Gambogi *in* Agricoltura ital., Pisa **62** [= II, **17**]: 227–245. 1962 [as 'f. sp. *spinaciae*']. The fungus is seed-borne and may also occur on beet and wild Chenopodiaceae, see Gourley *in* Can. J. Pl. Sci. **46**: 535. 1966 and Hoffmann *in* Z. PflKrankh. PflSchutz **80**: 604–608. 1973. For the disease symptoms see Hoffmann l.c.

ERYSIPHE CICHORACEARUM DC. ex Mérat [sensu lato]

rn Erysiphe cichoracearum DC. ex Mérat, Nouv. Fl. Env. Paris, ed. 2, **1**: 132. 1821.

dn ≡ *Erysiphe cichoracearum* de Candolle in de Candolle & de Lamarck, Fl. fr. [ed. 3] **2**: 274. 1805 [type on *Scorzonera hispanica*].

f. sp. *CICHORII* [Blumer]

Erysiphe cichoracearum f. sp. *cichorii* Blumer *in* Beitr. Kryptog-Flora Schweiz **7** (1): 260 [246–262]. 1933.

Note: The Powdery Mildew of chicory (witloof), which also occurs on endive (*Cichorium endivia* L.), is one of the various powdery mildews on Compositae arranged under the polymorphous collective species *E. cichoracearum*. The species concept of *E. cichoracearum*, which should not be restricted to Compositae, has been discussed extensively by Blumer, Echte Mehltaupilze 184–189. 1967 and Junell *in* Symb. bot. upsal. **19** (1): 94–99. 1967. Both authors conclude that *E. cichoracearum* includes various forms which differ morphologically in diameter of perithecia (cleistocarps), number of asci and ascospores, shape and number of appendages and size of conidia. However, the variability in these morphological features appeared to be continuous from one extreme to the other, which makes a morphological differentiation into smaller species at present unworkable. We have accepted therefore, Blumer's 1933 (l.c.) proposal to indicate the powdery mildew occurring on *Cichorium* species as a specialized pathogenic form of *E. cichoracearum* in spite of the significantly smaller perithecia [mostly 89–109 μm diam] and conidia [mostly 32.5–33 × 17.5–18 μm] than those of *E. cichoracearum* sensu stricto on *Scorzonera* [perithecia mostly 110–126 μm diam; conidia 36–40 × 20–24 μm]. For the characteristics of *E. cichoracearum* sensu lato see also Kapoor *in* C.M.I. Descr. pathog. Fungi Bact. 152. 1967.

ERYSIPHE CRUCIFERARUM Opiz ex Junell

Erysiphe cruciferarum Opiz ex Junell *in* Svensk bot. Tidskr. **61**: 217. 1967.

Θ ≡ *Erysiphe cruciferarum* Opiz *in* Lotos **5**: 42. 1855 [type on *Alyssum alyssoides* (L.) L.].

Note: In the literature before 1967 the Powdery Mildew of Cruciferae, especially common during dry summers on swedes and turnips, was known as *Erysiphe communis* (Wallr.) ex Schlecht.: Fr. sensu Blumer *in* Beitr. KryptogFlora Schweiz **7** (1): 177–187. 1933 or as *Erysiphe polygoni* DC. ex St.-Am. sensu Salmon *in* Mem. Torrey bot. Club **9**: 174–193. 1900. Both names are misapplied in this case. *E. communis*, according to its type, refers to the common powdery mildew of pea, a different species restricted to Leguminosae [the name has been used in many other senses and therefore is rejected (Art. 69), see check-list 2c *in* Neth. J. Pl. Path. **85**: 159. 1979 under *E. pisi* DC. ex St.-Am.]. *E. polygoni* sensu stricto also refers to a different species, recorded in Europe only on Polygonaceae [see e.g. Blumer, Echte Mehltaupilze 220–222. 1967]. In 1967 Junell (l.c.) pointed out that the rare perithecial state (cleistocarps) of the powdery mildew on Cruciferae has been first recognized as a separate taxon by Opiz (l.c.), who named it *E. cruciferarum* but without providing a description (nomen nudum). The mycelium of *E. cruciferarum* can survive on perennial cruciferous weeds and on winter *Brassica* spp. in the form of 'sub-infections', see Searle *in* Trans. Br. mycol. Soc **6**: 274–293. 1919 [under *E. polygoni*]. For descriptions and host lists of *E. cruciferarum* see Junell l.c. and Junell *in* Symb. bot. upsal. **19** (1): 29–30. 1967. See also Purnell & Sivanesan *in* C.M.I. Descr. pathog. Fungi Bact. 251. 1970. Differences in the reaction of swede cultivars to powdery mildew were described by Dixon & Furber *in* J. natn. Inst. agric. Bot. **12**: 308–313. 1971. For the susceptibility of cultivars of Brussels sprouts see Dixon *in* Pl. Path. **23**:105–109. 1974.

ERYSIPHE HERACLEI DC. ex St.-Am.

rn Erysiphe heraclei DC. ex de Saint-Amans, Fl. agén. 615. 1821.

dn ≡ *Erysiphe heraclei* de Candolle in de Candolle & de Lamarck, Fl. fr. [ed. 3] **5** [6]: 107. 1815 ["1805"].

= *Erysiphe umbelliferarum* de Bary *in* Abh. senckenb. naturforsch. Ges. **7**: 410. 1870.

Note: In warm summers field crops of carrot may become infected by this Powdery Mildew of Umbelliferae, see e.g. Hawkins & Phillips *in* Pl. Path. **9**: 113–114. 1960 and Boerema, Dorenbosch & van Kesteren *in* Versl. Meded. plziektenk. Dienst Wageningen **138** [Jaarb. 1962]: 184–186. 1963. On carrots in the Mediterranean region the disease may be highly destructive in field and seed crops, see Palti *in* Phytopath. mediterr. **14**: 87–93. 1975. Perithecia (cleistocarps) are often absent in *E. heraclei* [syn. *E. umbelliferarum*; in older literature also incorrectly referred to as '*E. communis*' and '*E. polygoni*', see note under *E. cruciferarum* Opiz ex Junell]. Within the powdery mildew on Umbelliferae various host-specific forms are recorded, see Hammarlund *in* Hereditas **6**: 36–37 [1–126]. 1925 [under '*E. communis*'] and Röder & Schultz *in* Zentbl. Bakt. ParasitKde Abt. II, **99** (1/4): 60–63. 1938 [under *E. umbelliferarum*]. However, cross-inoculations performed in Israel with strains from carrot, parsley and dill indicated a lack of specialization, see Palti l.c. For descriptions, hosts and other data on *E. heraclei* see Blumer, Echte Mehltaupilze 222–225. 1967, Junell *in* Symb. bot. upsal. **19** (1): 37–38. 1967 and Kapoor *in* C.M.I. Descr. pathog. Fungi Bact. 154. 1967. For literature references see also Palti l.c.

FUSARIUM CULMORUM (W. G. Sm.) Sacc.

Fusarium culmorum (W. G. Sm.) Saccardo *in* Syll. Fung. **11**: 651. 1895.

≡ *Fusisporium culmorum* W. G. Smith, Dis. Field Garden Crops 209. 1894.

[≡ *Fusarium roseum* 'Culmorum' according to the "cultivar concept" proposed by Snyder, Hansen & Oswald *in* J. Madras Univ. **27**: 185–192. 1957 for "morphologically different strains" of the collective species *Fusarium roseum* Link emend. Snyder & Hansen *in* Am. J. Bot. **32**: 663–664. 1945.]

Note: This plurivorous fungus has already been discussed in check-list 2b as common pathogen of cereals and grasses [*in* Neth. J. Pl. Path. **83**: 170–171. 1977]. Among the fieldcrops dealt with in this paper, leek is often found to be attacked by *F. culmorum*: Foot Rot, see e.g. Tamietti & Garibaldi *in* Riv. Patol. veg., Pavia IV, **13**: 69–75. 1977. For descriptions of *F. culmorum*, host range and literature references see Booth & Waterston *in* C.M.I. Descr. pathog. Fungi Bact. 26. 1964 and Booth, Genus Fusarium 173–176. 1971. See also Domsch, Gams & Anderson, Compendium Soil Fungi 311. 1980.

HELICOBASIDIUM BREBISSONII (Desm.) Donk

Helicobasidium brebissonii (Desm.) Donk *in* Taxon **7**: 164. 1958.

≡ *Protonema brebissonii* Desmazières *in* Pl. cryptog. N. France [ed. 1] Fasc. 14, No. 651. 1834; *in* Annls Sci. nat. (Bot.) II, **6**: 242–243. 1836.

= *Helicobasidium purpureum* Patouillard *in* Bull. Soc. bot. Fr. **32**: 172. 1885.

stat. myc. *RHIZOCTONIA CROCORUM* (Pers.) DC. ex Mérat

rn *Rhizoctonia crocorum* (Pers.) DC. ex Mérat, Nouv. Fl. Env. Paris, ed. 2, **1**: 134–135. 1821.

: Fries, Syst. mycol. **2** [Sect. 1]: 265. 1822.

dn ≡ *Rhizoctonia crocorum* (Pers.) de Candolle *in* Mém. Mus. Hist. nat., Paris **2**: 216. 1815; in de Candolle & de Lamarck, Fl. fr. [ed. 3] **5** [6]: 110. 1815 ["1805"].

dn ≡ *Sclerotium crocorum* Persoon, Syn. meth. Fung. 119. 1801.

Note: The soil-inhabiting *H. brebissonii*, formerly known as *H. purpureum*, attacks the underground parts of a wide range of plants including e.g. carrot and chicory (witloof): Violet Root Rot (Am.: Red Root). See also check-list 2a [*in* Neth. J. Pl. Path. **82**: 200–201. 1976] and 2c [*in* Neth. J. Pl. Path. **85**: 161–162. 1979]. For descriptions and illustrations of both states of the fungus see Buddin & Wakefield *in* Trans. Br. mycol. Soc. **12**: 116–140. 1927; and McNabb *in* N. Z. Jl Bot. **4**: 533–535. 1966. For disease symptoms (illustrations) and notes on the biology see Anonymous *in* Adv. Leafl. Minist. Agric. Fish. Fd, Lond. **346**. 1974.

LEPTOSPHAERIA MACULANS (Desm.) Ces. & de Not.

Leptosphaeria maculans (Desm.) Cesati & de Notaris *in* Comment. Soc. crittogam. ital. **1** (4): 235. 1863 [= Schema Sfer.].

≡ *Sphaeria maculans* Desmazières *in* Annls Sci. nat. (Bot.) III, **6**: 77. 1846 [not *S. maculans* Sowerby ex Berkeley and Broome *in* Ann. Mag. nat. Hist. II, **9**: 378. 1852].

stat. con. *PHOMA LINGAM* (Tode ex Schw.) Desm.

Phoma lingam (Tode ex Schw.) Desmazières *in* Annls Sci. nat. (Bot.) III, **11**: 281. 1849.

rn ≡ *Sphaeria lingam* Tode ex von Schweinitz *in* Schr. naturf. Ges. Leipzig **1** [= Syn. Fung. Car. sup.]: 45. 1822.

: Fries, Syst. mycol. **2** [Sect. 2]: 507–508. 1823.

dn ≡ *Sphaeria lingam* Tode, Fungi mecklenb. **2**: 51. 1791.

≡ *Plenodomus lingam* (Tode ex Schw.) von Höhnel *in* Sber. Akad. Wiss. Wien (Math.-naturw. Kl., Abt. I) **120**: 463. 1911.

Note: This well-known parasite of *Brassica* spp. – Dry Rot and Canker (Am.: Black Leg) – also occurs on various other cultivated and wild Cruciferae. The fungus may affect any part of its hosts, seedlings as well as older plants. For the disease symptoms see e.g. Cunningham *in* Bull. Dep. Agric. N.Z. **133**. 1927 and Buddin *in* Bull. Minist. Agric. Fish., Lond. **74**. 1934. In association with seeds and lesions ('cankers') or spots on living stems, 'bulbs', leaves and siliques, 'common' pseudoparenchymatous *Phoma* pycnidia occur; but on dead host material atypical thick-walled scleroplectenchymatous pycnidia and 'pycno-sclerotia' can be found. On account of this character, *Phoma lingam* represents [type species!] a separate group of pycnidial states: *Phoma* sect. *Plenodomus* [originally founded as the genus *Plenodomus* Preuss; compare Boerema & van Kesteren *in* Persoonia **3** (1): 17–28. 1964 and Boerema *in* Trans. Br. mycol. Soc. **67**: 299–303, 311–312 (289–319). 1976]. On host debris the fungus may also produce the scleroplectenchymatous perithecia (pseudothecia) of the perfect state, *Leptosphaeria maculans*. For descriptions of the different phenotypes of the pycnidial state see Boerema & van Kesteren l.c.; for the perfect state see e.g. Smith & Sutton *in* Trans. Br. mycol. Soc. **47**: 159–165. 1964 and Holm *in* Symb. bot. upsal. **14** (3): 36–37. 1957. Both states have repeatedly been confused with other fungi, see the discussion by Boerema l.c. With Brussels sprouts, common kale, marrow-stem kale and other varieties of *Brassica oleracea*, the disease is apparently chiefly transmitted by infected seeds. Recent studies of the disease on swede or rutabaga and oil-seed rape [subspecies of *Brassica napus*] have shown that in these field crops the perfect state plays a much more important role than seed infection, see e.g. Allen & Smith *in* N.Z. Jl agric. Res. **4**: 676–685. 1961; Lacoste, Louvet, Anselme, Alabouvette, Brunin & Pierre *in* C. r. hebd. Séanc. Acad. Agric. Fr. **55**: 981–989. 1969; Alabouvette & Brunin *in* Annls Phytopath. **2**: 463–475. 1970 and Brunin & Lacoste *in* Annls Phytopath. **2**: 477–488. 1970. For seed-testing methods and characters of *Phoma lingam* used in differentiation from the ubiquitous saprophyte *P. herbarum* Westend. [syn. *P. oleracea* Sacc.], which also often occurs on seeds of *Brassica* spp., see Handb. Seed Health Testing [Ed. Int. Seed Test. Ass.] III, Working Sheet 31. 1964. See further the discussion of *Leptosphaeria maculans* by Punithalingam & Holliday *in* C.M.I. Descr. pathog. Fungi Bact. 331. 1972, and the 'Studies on *Phoma lingam* and the dry rot on oil-seed rape' by Ndimande, Thesis Dep. Pl. Path. Ent. agric. Coll. Sweden, Uppsala 1976. The fungus is also treated in Domsch, Gams & Anderson, Compendium Soil Fungi 404. 1980.

MYCOCENTROSPORA ACERINA (Hartig) Deighton

Mycocentrospora acerina (Hartig) Deighton *in* Taxon **21**: 716. 1972.

≡ *Cercospora acerina* Hartig *in* Unters. forstbot. Inst. München **1**: 58. 1880.

≡ *Centrospora acerina* (Hartig) Newhall *in* Phytopathology **36**: 849. 1946.

Note: This soil-borne pathogen, known more widely by its synonym *Centrospora acerina*, can attack leaves, petioles, stems and roots of a wide range of plants. As causal organism of Anthracnose of caraway, the fungus has already been treated in check-list 2a [*in* Neth. J. Pl. Path. **82**: 201–202. 1976]. Among the vegetables grown as field crops, carrots are frequently infected. This may result in a root rot in the field and in storage: Licorice Rot, see e.g. Srivastava *in* Trans. Br. mycol. Soc. **41**: 223–226. 1958. Another common host is celeriac, whereby it may cause 'Scab'-like symptoms on the turnip-like crown resembling an attack by *Phoma appicola* Kleb. (q.v.), see Gündel *in* Z. PflKrankh. PflSchutz **83**: 591–605. 1976. For the recent name-change of *Centrospora* into *Mycocentrospora* see Deighton l.c. A good description and a complete list of synonyms is given by Deighton *in* Mycol. Pap. **124**: 2–4. 1971. For description and references to phytopathological literature see also Sutton & Gibson *in* C.M.I. Descr. pathog. Fungi Bact. 537. 1977. Media for isolating *M. acerina* and producing cultures of the fungus bearing either conidia or chlamydospores are given by Day, Lewis & Martin *in* Ann. appl. Biol. **71**: 201–202. 1972. The chlamydospores are considered to be the main means of survival but the conidia may also become chlamydosporic and supplement the surviving inoculum, see Wall & Lewis *in* Trans. Br. mycol. Soc. **70** (1): 157–160. 1978 and **71** (1): 143–146. 1978.

MYCOSPHAERELLA BRASSICICOLA (Duby) Lindau

Mycosphaerella brassicicola (Duby) Lindau *in* Nat. PflFam. **1**, Abt. 1 [Lief. 154] : 424. [Febr.] 1897.

≡ *Sphaeria brassicicola* Duby, Bot. gall. ed. 2, **2**: 712. 1830 [as '*brassicaecola* (Fries ined. ...)'; not *S. brassicicola* Berkeley & Broome in Berkeley, Outl. Br. Fungol. 401. 1860].

H ≡ *Mycosphaerella brassicicola* (Duby) Johanson ex Oudemans *in* Verh. K. Akad. Wet. [2^e^ Sectie] **2** (2) [= Rév. Champ. Pays-Bas **2**]: 210–211. [March] 1897 [as '*brassicaecola*'].

stat. sperm. *ASTEROMELLA BRASSICAE* (Chev.) Boerema & van Kest.

Asteromella brassicae (Chev.) Boerema & van Kesteren *in* Persoonia **3** (1): 18. 1964.

≡ *Asteroma brassicae* Chevallier, Fl. Env. Paris, ed. 1, **1**: 449. 1826.

= *Phyllosticta brassicicola* McAlpine *in* Bull. Dep. Agric. Vict. **1901**: 37. 1901 [as '*brassicaecola*'].

= *Asteromella brassicina* (Sacc.) Rupprecht *in* Sydowia **13**: 11. 1950.

≡ *Phyllosticta brassicina* Saccardo *in* Annls mycol. **11**: 16. 1913.

Note: *Mycosphaerella brassicicola* is the cause of a typical leaf spot of *Brassica* spp., known as Ring Spot. Not only the leaves but all parts of the hosts above ground may be attacked. A detailed description of the disease symptoms is given by Weimer *in* J. agric. Res. **32**: 97–132. 1926. At first small pycnidia of the spermogonial state appear on the spots; later on the perithecia develop. For descriptions of both states and the life cycle of the fungus see Dring *in* Trans. Br. mycol. Soc. **44**: 253–264. 1961. Primary infections generally are caused by ascospores, but seed-borne infections may also occur, see e.g. Vanterpool *in* Pl. Dis. Reptr **44**: 362–363. 1960. The nomenclature of both states has been discussed by Boerema & van Kesteren *in* Persoonia **3**: 17–18. 1964; they found that the spermogonial state of *M. brassicicola* has often been confused with the conidial state of *Leptosphaeria maculans* (Desm.) Ces. & de Not. (q.v.), which may also cause leaf spots on *Brassica* spp. A compilation of the literature data on the morphology, symptomatology and epidemiology of the fungus is given by Punithalingam & Holliday *in* C.M.I. Descr. pathog. Fungi Bact. 468. 1975.

PERONOSPORA DESTRUCTOR (Berk.) Fr.

V Peronospora destructor (Berk.) Fries, Summa Veg. Scand. [2] 493. 1849 [referring to No. 239 of Berkeley's Not. Br. Fungi, see below; the genus name was erroneously spelt by Fries as '*Perenospora*'].

≡ *Botrytis destructor* Berkeley *in* Ann. Mag. nat. Hist. **6**: 436 [= Not. Br. Fungi no. 239]. 1841.

H ≡ *Peronospora destructor* (Berk.) Caspary ex Berkeley, Outl. Br. Fungol. 349. 1860 [see note].

= *Peronospora schleideni* Unger *in* Bot. Ztg **5**: 315. 1847.

Note: *P. destructor* is particularly well known as the Downy Mildew of onions, but may also attack leek and other species of *Allium*. The transfer of the basionym *Botrytis destructor* to *Peronospora* Corda is generally thought to have been made first by Caspary in Berkeley's book of 1860 (l.c.) but Shaw *in* Mycologia **41**: 331. 1949 pointed out that Fries had already introduced the combination *Peronospora destructor* in 1849 (l.c.). The host plants of this downy mildew may be infected at all stages of growth. Diseased foliage of onions is often secondarily attacked by *Alternaria porri* (Ell.) Cif. (q.v.). The mycelium of *P. destructor* may grow down into the bulbs, where it can persist through the winter [first pointed out by Murphy & McKay *in* Scient. Proc. R. Dublin Soc. II, **18**: 237–261. 1926]. Onion bulbs containing perennial mycelium may give rise to systemically infected plants which may lead to an epidemic, see e.g. the discussion by Virányi *in* Acta phytopath. Acad. Sci. hung. **9**: 311–314. 1974. The disease is not normally transmitted with seed. Neither do oospores appear to carry the downy mildew from one season to the next, even when present in the soil in large numbers. A good description of the fungus and detailed data on the primary and secondary stages of the disease on onions can be found in Butler & Jones, Pl. Path. 693–699. 1949. See also Mukerji *in* C.M.I. Descr. pathog. Fungi Bact. 456. 1975, who gives additional literature references. In the Netherlands the downy mildew of onions has been investigated extensively by van Doorn *in* Tijdschr. PlZiekt. **65**: 193–255. 1959. See further the studies on the biology and ecology of the fungus by Virányi *in* Acta phytopath. Acad. Sci. hung. **9**: 315–318. 1974 and **10**: 321–328. 1975. For resistance of onions to *P. destructor* see Angelov, Buchvarov & Vitanov *in* Grad. loz. Nauka **14**: 87–91. 1977.

PERONOSPORA FARINOSA (Fr.) Fr.

Peronospora farinosa (Fr.) Fries, Summa Veg. Scand. [**2**]: 493. 1849.

≡ *Botrytis farinosa* Fries, Syst. mycol. **3** [Sect. 2]: 404. 1832 ['In foliis vivis v.c. Atriplicibus'].

f. sp. *SPINACIAE* [Byford]

Peronospora farinosa f. sp. *spinaciae* Byford *in* Trans. Br. mycol. Soc. **50**: 606. 1967.

= *Peronospora effusa* (Grev.) Cesati *in* Klotzschii Herb. mycol. [Ed. Rabenh.] Cent. 19, No. 1880. 1854 [as '*P. (Botrytis) effusa* Cesati'; ref. Schlechtendal *in* Bot. Ztg **12** (17 March): 190. 1854].

≡ *Botrytis effusa* Greville, Fl. edin. 468. 1824.

H ≡ *Peronospora effusa* (Grev.) Tul. *in* C. r. hebd. Séanc. Acad. Sci., Paris **38**: 1103. 1854 [after June].

= *Peronospora spinaciae* Laubert *in* Gartenflora **55**: 464. 1906.

Note: Yerkes & Shaw *in* Phytopathology **49**: 499–507. 1959 showed that the specific Downy Mildew of spinach cannot be distinguished morphologically from the downy mildews parasitizing other Chenopodiaceae. It is at present general practice, therefore, to indicate the downy mildew of spinach not as a separate species, but as a specialized pathogenic form, f. sp. *spinaciae*, of the collective species *P. farinosa* as proposed by Yerkes & Shaw l.c. and effectuated by Byford l.c. This also applies in the case of the downy mildew of beet [*P. farinosa* f.sp. *betae* Byford; see check-list 2a *in* Neth. J. Pl. Path. **82**: 203. 1976]. The epithet '*farinosa*' introduced by Fries in the starting-point book for a form of this collective species on *Atriplex* is conserved against the older epithet '*effusa*' used by Greville l.c. for the form on spinach. A good description, and notes on the disease symptoms and biology of the downy mildew of spinach can be found in Butler & Jones, Pl. Path. 691–693. 1949 under *P. effusa*. For the genetics of resistant varieties of spinach to physiologic races of the pathogen see e.g. Eenink *in* Euphytica **25**: 713–715. 1976.

PERONOSPORA PARASITICA (Pers. ex Pers.) Fr.

Peronospora parastitica (Pers. ex Pers.) Fries, Summa Veg. Scand. [**2**]: 493. 1849.

rn ≡ *Botrytis parasitica* Pers. ex Persoon, Mycol. eur. **1**: 35. 1822.
: Fries, Syst. mycol. **3** [Sect. 2]: 403–404. 1832.

dn ≡ *Botrytis parasitica* Persoon, Obs. mycol. **1**: 96. 1796.

H = *Peronospora parasitica* (Pers. ex Pers.) Tulasne *in* C. r. hebd. Séanc. Acad. Sci., Paris **38**: 1103. 1854.

= *Peronospora brassicae* Gäumann *in* Beih. bot. Centbl. [Zentbl.] **35** (I): 521. 1918.

= *Peronospora brassicae* f. sp. *brassicae* Gäumann *in* Landw. Jb. Schweiz **40**: 467. 1926.

= *Peronospora brassicae* f. *brassicae-nigrae* Săvulescu & Rayss *in* Annls mycol. **32**: 44. 1934.

= *Peronospora brassicae* f. sp. *napi* Dzhanuzakov *in* Bot. Zh. SSSR **47**: 862. 1962.

= *Peronospora brassicae* f. sp. *rapae* Dzhanuzakov *in* Bot. Zh. SSSR **47**: 862. 1962.

= *Peronospora brassicae* f. sp. *raphani* Gäumann *in* Landw. Jb. Schweiz **40**: 467. 1926.

H = *Peronospora brassicae* f. sp. *raphani* Sawada *in* Rep. Govt Res. Inst. Dep. Agric. Formosa **61**: 24. 1933.

= *Peronospora brassicae* f. sp. *rapiferae* Dzhanuzakov *in* Bot. Zh. SSSR **47**: 862. 1962.

= *Peronospora brassicae* f. sp. *sinapidis* Gäumann *in* Landw. Jb. Schweiz **40**: 467. 1926.

Note: This species is listed here according to the concept of Yerkes & Shaw *in* Phytopathology **49**: 499–507. 1959, who merged all Downy Mildews on Cruciferae into *P. parasitica*. They pointed out that when the downy mildews on all hosts of this family were considered, there were no suitable or reliable morphological differences but a continuous overlapping series. See also the review of the genus *Peronospora* by Waterhouse in Ainsworth, Sparrow & Sussmann [Ed.]. The Fungi **IV B**: 165–168. 1973. The downy mildews of the cruciferous field crops were formerly arranged under *P. brassicae* and further in various ways classified as specific host-related forms, see the infraspecific taxa listed above and the discussion by Gustavsson *in* Op. bot. Soc. bot. Lund **3** (1): 79–85. 1959. However, the studies by McMeekin *in* Phytopathology **59**: 693–696. 1969 and Dickinson & Greenhalgh *in* Trans. Br. mycol. Soc. **69**: 111–116. 1977 have shown that the host range of specific strains of the pathogen from cultivated crucifers is variable and unrelated to the taxonomy of the host family. It is reasonable that a number of specialized forms exists on crucifers [see check-list 1a under *P. parasitica* f. sp. *galligena* (Blumer) Boerema & Verhoeven *in* Neth. J. Pl. Path. **78**, Suppl. 1: 33. 1972], but the doubt surrounding the host range of the downy mildews occurring on cruciferous field crops precludes at present any subdivision of *P. parasitica* on these crops. Downy mildew on crucifers may be confused with White Blister caused by *Albugo candida* (Pers. ex Hook.) O. Kuntze (q.v.), especially by the frequent coexistence of the two fungi. For the biology, disease symptoms and characteristics of *P. parasitica* in comparison with those of *A. candida* see Butler & Jones, Pl. Path. 637–639. 1949.

PHOMA APIICOLA Kleb.

Phoma apiicola Klebahn *in* Z. PflKrankh. **20**: 22. 1910.

Note: This fungus is responsible for a disease of celeriac and celery known as Root Rot (Am.: Phoma Root and Crown Rot). In case of severe infection, the fleshy turnip-like crown of celeriac exhibits a wrinkled scabby surface [Dutch: Schurft (scab)] and the slender roots of the plant may become entirely rotted. Infections on the above-ground portions of the leaves have been reported but are unknown in the Netherlands; however, the enlarged base of the leaf-stalks is always very liable to attack. For descriptions of the disease symptoms see Bennett *in* Tech. Bull. Mich. [agric. Coll.] agric. Exp. Stn **53**. 1921 [celery] and Goossens *in* Tijdschr. PlZiekt. **34**: 273–348. 1928 [celeriac]. 'Scab'-like symptoms on the fleshy celeriac crown may also be caused by *Alternaria radicina* Meyer & al. (q.v.) and *Mycocentrospora acerina* (Hartig) Deighton (q.v.). *Phoma apiicola* is mainly soilborne and only occasionally found on seed. Inoculation experiments by Bennett l.c. have shown that the fungus is also able to attack other cultivated Umbelliferae. The characteristics of *P. apiicola* in vitro on different agar media have been studied in detail by Goossens l.c. From mono-conidium isolates he obtained two phenotypes: cultures with relatively small pycnidia [70–180 μm diam, '*micro-forma*'] and cultures with pycnidia of usual size [175–420 μm diam, '*macro-forma*']. When grown together these forms produce relatively large 'conjunct pycnidia' at the line of contact of their mycelia.

PHOMA EXIGUA Desm. var. *EXIGUA*

Phoma exigua Desm. *in* Annls Sci. nat. (Bot.) III, **11**: 282–283. 1849, var. *exigua* [varietal name to cite without an author's name. Art. 26; name automatically established (autonym) by the publication in 1965 of the varietal name *P. exigua* var. *linicola* (Naumov & Vass.) Maas].

= *Phoma solanicola* Prillieux & Delacroix *in* Bull. Soc. mycol. Fr. **6**: 179. 1890.

= *Ascochyta phaseolorum* Saccardo *in* Michelia **1** (2): 164. 1878.

Note: The soil-borne *P. exigua* var. *exigua* is a plurivorous weak or wound parasite of world-wide distribution and especially known by its occurrence in association with gangrene lesions of potato tubers, see Series 2a of this check-list [*in* Neth. J. Pl. Path. **82**: 203–204. 1976]. Among the field crops dealt with in this paper, chicory (witloof) is often found to be attacked by *P. exigua* var. *exigua*: Rot of the roots during forcing and storage, see Vegh, Bourgeois & Bousquet *in* Revue hort. **144** (2313): 43–46. 1973 and Dennis & Davis *in* Pl. Path. **27**: 49. 1978. The fungus is also recorded as a pathogen of carrots: root rot and lesions on leaves, petioles and seeds, see Mirkova *in* RastitZasht. Nauka **1975** (1/2): 64–70. 1975. The conidia of *P. e. var. exigua* are extremely variable in size; they are in principle one-celled, but in vivo a variable percentage of the conidia often become two-celled ['secondary septation', cf. Boerema & Bollen *in* Persoonia **8**: 111–144. 1975]. This explains its extensive synonymy, see Boerema & Höweler *in* Persoonia **5**: 15–28. 1967 and Boerema & Dorenbosch *in* Stud. Mycol. **3**: 25–29. 1973. As plurivorous weak parasite, the fungus is repeatedly treated in the literature under the synonym *Ascochyta phaseolorum*, originally described from dwarf beans, see check-list 2c [*in* Neth. J. Pl. Path. **85**: 166–167. 1979]. Descriptions, synonyms and hosts of *P. e.* var. *exigua* are given in Boerema & Höweler l.c.; Boerema & Dorenbosch l.c.; and Boerema *in* Trans. Br. mycol. Soc. **67**: 291–295. 1976. Typical strains of *P. e.* var. *exigua* produce an antibiotic 'E', which in plate cultures is demonstrable by oxidation with alkali, see Boerema & Höweler l.c. and Logan & O'Neill *in* Trans. Br. mycol. Soc. **55**: 67–75. 1970. The fungus is also treated in Domsch, Gams & Anderson, Compendium Soil Fungi 634. 1980.

PHYTOPHTHORA PORRI Foister

Phytophthora porri Foister *in* Trans. Proc. bot. Soc. Edinb. **30**: 277–278. 1931. Note: *P. porri* is well-known as the causal organism of White Tip of leek, but may also cause Leaf Blight on onions and other *Allium* spp. Further it is also recorded as pathogen on plants of other genera, see the literature references by Stamps *in* C.M.I. Descr. pathog. Fungi Bact. 595. 1978. For the white tip disease of leek see Foister l.c.; Butler & Jones, Pl. Path. 710–712. 1949 and van Hoof *in* Tijdschr. PlZiekt. **65**: 37–43. 1959. The disease on onions was first described by Tichelaar & van Kesteren *in* Neth. J. Pl. Path. **73**: 103–104. 1967 and subsequently studied by Yokoyama *in* Bull. Fukuoka agric. Exp. Stn **22**. 1976 [55 pp. Japanese; with colour plates] and Griffin & Jones *in* Pl. Path. **26**: 149–150. 1977. Foister's (l.c.) original description of *P. porri* has been reproduced by Waterhouse *in* Mycol. Pap. **122**: 42–43. 1970. Other good descriptions can be found in Butler & Jones l.c. and Stamps l.c. Characters used in differentiation from other species of *Phytophthora* may be found in the tabular key published by Newhook, Waterhouse & Stamps *in* Mycol. Pap. **143**: 1–20. 1978. Tichelaar & van Kesteren l.c. noted that their isolate from onion did not cause symptoms on leek, but in inoculation experiments by Griffin & Jones l.c. an isolate of *P. porri* from leek appeared to be also pathogenic to onion. Yokoyama l.c. found no physiologic specialization of *P. porri* on *Allium* crops in Japan; see further Stamps l.c.

PLASMODIOPHORA BRASSICAE Wor.

Plasmodiophora brassicae Woronin *in* Arb. St. Petersburg naturf. Ges. **8**: 169. 1877; *in* [Pringsh.] Jb. wiss. Bot. **11**: 548. 1878.

Note: This causal organism of Club Root (Finger-and-Toe) of cultivated and wild crucifers is discussed in detail in Karling, Plasmodiophorales [ed. 2] 35–42 [description, physiological races], 112–180 [disease symptoms, biology, hosts, control]. 1968. Although *P. brassicae* is primarily a parasite of crucifers, its sporangial stages have been found in the root hairs of non-cruciferous plants. With the cultivated crucifers there are considerable differences in varietal susceptibility to club root and there are numerous publications on breeding and selection for club root resistance (see Karling l.c.). For recent lists of publications on club root see Jönsson *in* Acta Agric. scand. **25**: 261–274. 1975 and Yoshikawa & Buczacki *in* Rev. Pl. Path. **57**: [253] 256–257. 1978 [Japanese research]. The seriousness of club root in cruciferous crops has led to an international approach of the problems associated with pathogen variation and host resistance, see e.g. Buczacki, Toxopeus, Mattusch, Johnston, Dixon & Hobolth *in* Trans. Br. mycol. Soc. **65**: 295–303. 1975. A method for the determination of numbers of cysts or resting spores in soil is given by Buczacki & Ockendon *in* Ann. appl. Biol. **88**: 363–367. 1978. For a recent review of the extensive literature data on the fungus see Buczacki *in* C.M.I. Descr. pathog. Fungi Bact. 621. 1979.

PLASMOPARA CRUSTOSA (Fr.) Jörst.

Plasmopara crustosa (Fr.) Jörstad [Jørstad] *in* Skr. norske Vidensk-Akad. [Mat.-naturv. Kl.] II [= Ny Serie], **10**: 12. 1963.

≡ *Botrytis crustosa* Fries, Syst. mycol. **3** [Sect. 2]: 403. 1832.

≡ *Peronospora crustosa* (Fr.) Fries, Summa Veg. Scand. [**2**]: 493. 1849.

= *Plasmopara umbelliferarum* (Casp.) Schroeter ex Wartenweiler *in* Annls mycol. **16**: 252. 1918.

≡ *Peronospora umbelliferarum* Caspary *in* Ber. Verh. K. preuss. Akad. Wiss. Berl. **1855**: 328. 1855.

= *Plasmopara nivea* auct. [see note]

Note: This Downy Mildew of Umbelliferae (e.g. carrot) has already been discussed in check-list 2a [*in* Neth. J. Pl. Path. **82**: 206. 1976]. In older literature it is usually identified as *Plasmopara nivea* (Mart. ex Unger) Schroet., a name based on *Botrytis nivea* Mart., which refers to the downy mildew of Cruciferae, *Peronospora parasitica* (Pers. ex Pers.) Fr. (q.v.). There are many separate *Plasmopara* species described from umbelliferous plants which in our opinion should all be arranged under *Pl. crustosa*, even if they are biologically distinct [compare Jörstad *in* Nytt Mag. Bot. **11**: 61–64. 1964 and the notes under *Peronospora parasitica* and *P. farinosa* (Fr.) Fr.]. The conidial morphology of *Pl. crustosa* has been studied by e.g. Wartenweiler l.c.: 249–299 [under '*Pl. nivea*'] and Holm *in* Svensk bot. Tidskr. **40**: 55–62. 1946 [under *Pl. umbelliferarum*]. Oospores are apparently rare in this species, see Jörstad 1964 l.c.

PLEOSPORA BJOERLINGII Byford

Pleospora bjoerlingii Byford *in* Trans. Br. mycol. Soc. **46**: 614. 1963.

H ≡ *Pleospora betae* Björling *in* Bot. Notizer **1944**: 218–220. 1944 [not *Pleospora betae* Nevodovsky, Griby ross. Exs. No. 247. 1915 = *Pleospora calvescens* (Fr.) Tul.].

stat. con. *PHOMA BETAE* Frank

Phoma betae Frank *in* Z. Rübenzuckerind. **42**: 904–906. 1892.

= *Phyllosticta betae* Oudemans *in* Ned. kruidk. Archf II, **2**: 181. 1877.

= *Phyllosticta spinaciae* Zimmermann *in* Verh. naturf. Ver. Brünn **47**: 87. 1909.

= *Phoma spinaciae* Bubák & Krieger apud Bubák *in* Annls mycol. **10**: 47. 1912.

Note: This well-known parasite of beet [check-list 2a *in* Neth. J. Pl. Path. **82**: 207. 1976] is occasionally involved in Damping-off of spinach, see Peters *in* NachrBl. dt. PflSchutzdienst, Berl. **4**: 83–84. 1924 and Boerema & van Kesteren *in* Gewasbescherming **3**: 66–67. 1972. This usually seed-borne disease of spinach may be confused with damping-off caused by *Colletotrichum dematium* f. *spinaciae* (Ell. & Halst.) von Arx (q.v.) and *Pythium* species as *P. ultimum* Trow var. *ultimum* (q.v.). The fungus also produces pale spots on leaves of spinach, especially in seed growing crops; these leaf spots may be confused with Leaf Spot caused by *Cladosporium variabile* (Cooke) de Vries (q.v.). The perfect state is rare, and has only been recorded four times from sugarbeet seed stalks, see Bugbee *in* Phytopathology **69**: 277–278. 1979. The synonymy of the conidial state and the cultural characters of the fungus are discussed by Boerema & Dorenbosch *in* Stud. Mycol. **3**: 7–8, 22–23. 1973. For description of both states in vivo see Booth *in* C.M.I. Descr. pathog. Fungi Bact. 149. 1967 [as '*P. björlingii*']. The fungus has also been isolated from various wild Chenopodiaceae, see Boerema & van Kesteren l.c. and Bugbee & Soine *in* Phytopathology **64**: 1258–1260. 1974.

PLEOSPORA HERBARUM (Fr. ex Fr.) Rabenh. var. *HERBARUM*

Pleospora herbarum (Fr. ex Fr.) Rabenhorst *in* Klotzschii Herb. mycol., ed. 2, Cent. 6, No. 547 [a–c]. 1857; *in* Bot. Ztg **15**: 428. 1857 [ref. Schlechtendal], var. *herbarum* [varietal epithet to be cited without an author's name, Art. 26; name automatically established (autonym) by the publication in 1961 of *P. herbarum* var. *occidentalis* Wehm.].

rn ≡ *Sphaeria herbarum* Fries ex Fries, Syst. mycol. **2** [Sect. 2]: 511. 1823 [not *S. herbarum* Persoon, Syn. meth. Fung. 78. 1801 ex Hooker, Fl. scot. **2**: 7. 1821, which species was deliberately not accepted by Fries].

dn ≡ *Sphaeria herbarum* Fries *in K.* [svenska] VetenskAkad. [nya] Handl. 39: 109. 1818.

STEMPHYLIUM BOTRYOSUM Wallr.

Stemphylium botryosum Wallroth, Fl. crypt. Germ. **2**: 300. 1833.

Note: The nomenclature and taxonomy of this plurivorous fungus has already been discussed in check-list 2c [*in* Neth. J. Pl. Path. **85**: 169–170. 1979] as pathogen of leguminous field crops. Among the field crops dealt with in this paper, onions are frequently attacked by *Pleospora herbarum* var. *herbarum*: Leaf Spot, see e.g. Wu *in* Pl. Prot. Bull., Taiwan **19**: 202–205. 1977. The spots, which may also occur on seed stalks and bulbs, bear only the conidial state, *Stemphylium botryosum;* they are black-mouldy in colour, instead of purplish as in the purple blotch disease caused by *Alternaria porri* (Ell.) Cif. (q.v.). For a good description of both states of the fungus and references to phytopathological literature see Booth & Pirozynski *in* C.M.I. Descr. pathog. Fungi Bact. 150. 1967. Detailed data on the morphology of the conidial state and the cultural characteristics of the fungus are given by Neergaard, Dan. Alternaria and Stemphylium 361–379. 1945. The fungus is also treated in Domsch, Gams & Anderson, Compendium Soil Fungi 663. 1980.

PSEUDOCERCOSPORELLA CAPSELLAE (Ell. & Ev.) Deighton

Pseudocercosporella capsellae (Ell. & Ev.) Deighton *in* Mycol. Pap. **133**: 42. 1973.

≡ *Cylindrosporium capsellae* Ellis & Everhart *in* J. Mycol. **3**: 130. 1887.

= *Cercosporella brassicae* (Fautr. & Roum.) von Höhnel *in* Annls mycol. **22**: 193. 1924.

≡ *Cylindrosporium brassicae* Fautrey & Roumeguère *in* Fungi sel. exs. [Ed. Roumeguère], Cent. 57, No. 5679. 1891; *in* Revue mycol. **13**: 81. 1891.

V = *Cercosporella albomaculans* (Ell. & Ev.) Saccardo *in* Sylloge Fung. **11**: 606. 1895 [as '*albo-maculans*'].

≡ *Cercospora albomaculans* Ellis & Everhart *in* Proc. Acad. nat. Sci. Philad. **1894** [vol. **46**]: 378. 1894 [as '*Cercospora (Cercosporella) albo-maculans*'].

Note: This species, commonly known as *Cercosporella brassicae*, may cause leaf spots on various cultivated and wild Cruciferae; on swede and turnip the disease is called White Spot. Deighton l.c.: 42–46 pointed out that this fungus has been repeatedly described in *Cercosporella* Sacc. or has been transferred to it from other genera [the synonymy includes at least 18 binomials]. He has placed it in the new genus *Pseudocercosporella* Deighton on account of the fact that its method of conidial liberation is quite different from that of typical *Cercosporella* spp. For a detailed description of *P. capsellae*, complete synonymy and list of hosts, reference may also be made to Deighton l.c. A good description of the disease symptoms and a useful bibliography is given by Miller & McWhorter *in* Phytopathology **38**: 893–895. 1948.

PUCCINIA ALLII Rudolphi [sensu lato]

Puccinia allii Rudolphi *in* Linnaea, Halle **4**: 392. 1829.

= *Puccinia mixta* Fuckel *in* Fungi rhen. (Fasc. 1) No. 377. 1863; *in* Jb. nassau. Ver. Naturk. **23–24** [= Symb. mycol.]: 58. 1870 ["1869 und 1870"].

= *Puccinia porri* Winter *in* Rabenh. Krypt.-Fl. [ed. 2], Pilze **1** [Lief. 3] : 200. 1882 [vol. dated "1884"] [as comb. nov. of the uredial name *Uredo porri* Sowerby, Engl. Fungi Suppl. II, tab. 411. 1809].

Note: In its modern concept this species includes the autoecious Rusts (uredinia, telia, and sometimes also spermogonia and aecidia) occurring on various species of *Allium*, including leek and onion. On leek the rust was formerly generally known as *P. porri*. For the characteristics of *P. allii* sensu lato used in differentiation from other rusts occasionally occurring on cultivated *Allium* species, see the description and discussion of *P. allii* by Laundon & Waterston *in* C.M.I. Descr. pathog. Fungi Bact. 52. 1965. See also Wilson & Henderson, Br. Rust Fungi 217–218. 1966. A particular character of *P. allii* sensu lato is the production of a variable number of unicellular teleutospores: mesospores. *P. allii* sensu stricto was based on specimens with only a few mesospores, and *P. porri* sensu stricto refers to specimens with a large number of mesospores. The occurrence of few or many unicellular teleutospores is also generally associated with some other minor differences, see the discussion by Gäumann *in* Beitr. KryptogFl. Schweiz **12**: 430–437. 1959. Further there should be hemi-forms, producing only uredinia and telia [*P. allii* sensu Gäumann l.c.] as well as (aut)eu-forms with all spore stages [*P. porri* sensu Gäumann l.c.]. These differences are also apparently correlated with adaptations to different species of *Allium*, but insufficient information is available with respect to this point. The rust is generally more common on leek than on onion. Aecidia and spermogonia of *P. allii* have not been recorded in the Netherlands. On leek often only uredinia occur, which suggest that the fungus may also hibernate by uredospores. For the disease symptoms on leek and the susceptibility of various cultivars to this rust, see Dixon *in* J. natn. Inst. agric. Bot. **14**: 100–104. 1976.

PUCCINIA HIERACII (Röhl.) H. Mart. var. *HIERACII*

Puccinia hieracii (Röhl.) H. von Martius, Prodr. Fl. Mosq. ed. 2, 226. 1817, var. *hieracii* [epithet derived from the uredinial name *Uredo hieracii* Schumacher, Enum. Pl. Saell. **2**: 232. 1803; the first valid description of the telial state under the epithet *hieracii* is given in 1813 by Röhling (see below), comp. Art. 59; the varietal name has to be cited without an author's name, Art. 26, see note].

Δ ≡ *Puccinia flosculosorum* var. *hieracii* Röhling, Deutschl. Fl. ed. 2, III, **3**: 131. 1813 [as comb. nov. of the uredinial name *Uredo hieracii* Schum., see above].

f. sp. **CICHORII** [(Bellynck ex Kickx) comb. nov.]

≡ *Puccinia cichorii* Bellynck ex Kickx, Fl. crypt. Fland. **2**: 65. 1867 [with reference to specimen No. 200 in Bellynck's personal herbarium collection 'Cryptogames recueillis dans la province de Namur' Fasc. 2, 1854].

= *Puccinia endiviae* Passerini apud von Thümen *in* Hedwigia **12**: 114. 1873.

Note: The autoecious Rust of chicory (witloof), which also attacks endive [*Cichorium endivia* L.] (usually only uredinia and telia, see below), was previously recognized as a distinct species, but is at present generally regarded as only a specialized host form of a collective species occurring on various Compositae, with as oldest valid name *Puccinia hieracii*. The correct author citation of this species has been pointed out by Cummins & Stevenson *in* Pl. Dis. Reptr Suppl. **240**: 151. 1956. For description of *P. hieracii* sensu lato see Wilson & Henderson, Br. Rust Fungi 203. 1966. The specialized form *cichorii* belongs to the variety *hieracii*, which is automatically established by the differentiation of four separate varieties within *P. hieracii* sensu lato, see Hylander, Jörstad [Jϕrstad] & Nannfeldt *in* Op. bot. Soc. bot. Lund **1**: 54–55. 1953 and Cummins *in* Mycotaxon **5**: 404. 1977. In the Netherlands only uredinia and telia have been recorded on chicory (witloof) and endive, but Mayor *in* Bull. Soc. neuchâtel. Sci. nat. **46** [**1920–21**]: 26. 1922 proved that spermogonia and uredinioid aecidia may also be produced. See also Gäumann *in* Beitr. KryptogFl. Schweiz **12**: 1067–1068. 1959.

PYTHIUM ULTIMUM Trow var. *ULTIMUM*

Pythium ultimum Trow *in* Ann. Bot. **15**: 300–301. 1901 [reproduced *in* Mycol. Pap. **110**: 68. 1968], var. *ultimum* [varietal name to be cited without author's name, Art. 26; name automatically established (autonym) by the publication in 1960 of *P. ultimum* var. *sporangiiferum* Drechsl.].

Note: This ubiquitous soil-borne organism may cause Damping-off and Root Rot in a large number of plant species, including most vegetables grown as field crops. Its occurrence on other field crops has already been discussed in Series 2a, 2b and 2c of the check-list [*in* Neth. J. Pl. Path. **82**: 208–209. 1976; **83**: 190–191. 1977 and **85**: 172. 1979]. A review of the extensive literature on *P. ultimum* is given by Domsch, Gams & Anderson, Compendium Soil Fungi 694. 1980. For other *Pythium* species pathogenic to vegetable crops see e.g. Robertson *in* N. Z. Jl agric. Res. **19**: 97–102. 1976 and Kalu, Sutton & Vaartaja *in* Can. J. Pl. Sci. **56**: 555–561. 1976. For differentiating characters of *Pythium* species see the key published by Waterhouse *in* Mycol. Pap. **109**: 1–15. 1967.

SCLEROTINIA MINOR Jagger

Sclerotinia minor Jagger *in* J. agric. Res. **20**: 333. 1920.

Note: This species is sometimes associated with Sclerotinia Disease or Sclerotinia Rot of vegetables, such as carrots, celeriac and chicory (witloof). It can easily be distinguished from *S. sclerotiorum* (Lib.) de Bary (q.v.), which is much more often involved, because of the smaller sclerotia [0.3–2 mm; in *S. sclerotiorum* 1–8 mm or more across]. In agar cultures these sclerotia develop over the whole colony surface, not only near the edge, as is usually the case with *S. sclerotiorum*. The sclerotia germinate by the development of a stipe from which an apothecium develops (carpogenic germination) or by mycelium erupting from within the sclerotium (mycelial germination). The development of apothecia in the field has been studied by Hawthorn *in* N. Z. Jl agric. Res. **19**: 383–386. 1976. For the mycelial germination see Adams & Tate *in* Pl. Dis. Reptr **60**: 515–518. 1976. Based on a statistical analysis of ascus and ascospores, Purdy *in* Phytopathology **45**: 421–427. 1955 regarded *S. minor* as a synonym of *S. sclerotiorum*, but his view has not generally been accepted, see the note under *S. sclerotiorum* and Kohn *in* Phytopathology **69**: 881–886. 1979. A detailed description of the sclerotia, apothecia and microconidial (spermatial) state (*Myrioconium* sp.) of the fungus can be found in the monographic revision of the genus *Sclerotinia* by Kohn *in* Mycotaxon **9**: 365–444 [385]. 1979. A method for quantitative isolation of sclerotia of *Sclerotinia minor* from soil has been described by Adams *in* Pl. Dis. Reptr **63**: 349–351. 1979.

SCLEROTINIA SCLEROTIORUM (Lib.) de Bary

Sclerotinia sclerotiorum (Lib.) de Bary, Vergl. Morph. Pilze [= ed. 2 Morph. Physiol. Pilze, etc.] 22, 56, 236. 1884.

≡ *Peziza sclerotiorum* Libert *in* Pl. cryptog. Ard., Fasc. 4, No. 326. 1837.

≡ *Whetzelinia sclerotiorum* (Lib.) Korf & Dumont *in* Mycologia **64**: 250. 1972.

stat. myc. *SCLEROTIUM VARIUM* Pers. ex S. F. Gray

rn *Sclerotium varium* Pers. ex S. F. Gray, Nat. Arr. Br. Pl. **1**: 591. 1821.

: Fries, Syst. mycol. **2** [Sect. 1]: 257. 1822.

dn ≡ *Sclerotium varium* Persoon, Syn. meth. Fung. 122. 1801.

Note: This plurivorous plant parasite [see also check-list 2a and 2c *in* Neth. J. Pl. Path. **82**: 209. 1976 and **85**: 172–173. 1979] may cause damage to most vegetables and cruciferous crops dealt with in this paper: Sclerotinia Disease or Sclerotinia Rot (Am.: Sclerotinia Wilt). Only leek and onion are not recorded as hosts. Recently the generic name *Whetzelinia* Korf & Dumont (l.c.) has been proposed for *S. sclerotiorum* and related species because of the lectotypification of the complex-genus *Sclerotinia* Fuckel with the quite different fungus *S. candolleana* (Lév.) Fuckel [see Honey *in* Mycologia **20**: 128 (127–157). 1928 and Whetzel *in* Mycologia **37**: 668 (648–714). 1945 under *Ciborinia candolleana* (Lév.) Whetzel]. As Korf & Dumont's suggestion has been rejected by most phytopathologists, *S. sclerotiorum* was proposed as neotype of a redefined genus *Sclerotinia*, which is now likely to become a nomen conservandum [Petersen *in* Taxon **27**: 543. 1978]. The literature concerning *S. sclerotiorum* is very extensive, see e.g. the discussion of this fungus in Domsch, Gams & Anderson, Compendium Soil Fungi 712. 1980. It should be noted that American references under *S. sclerotiorum* may refer to the related species *S. trifoliorum* Erikss. [Rot of leguminous plants] and *S. minor* Jagger (q.v.), which Purdy *in* Phytopathology **45**: 421–427. 1955 has synonymized with *S. sclerotiorum*. This broad concept of *S. sclerotiorum* has not generally been accepted because of essential differences in biological, anatomical and biochemical properties of these taxa, see the monographic revision of the genus *Sclerotinia* by Kohn *in* Mycotaxon **9**: 365–444. 1979 and Domsch, Gams & Anderson l.c. See also Kohn *in* Phytopathology **69**: 881–886. 1979 and check-list 2c under *S. trifoliorum* [*in* Neth. J. Pl. Path. **85**: 173–174. 1979]. The relatively large sclerotia of *S. sclerotiorum* [1–8 mm or more diam] mostly germinate to form apothecia (carpogenic germination) in spring. Therefore infection does not only occur at soil level but often on the upper parts of the plants. In oil-seed rape, for example, stem and head infections (Am.: Stem Blight; Head Blight) by air-borne ascospores often occur, compare Williams & Stelfox *in* Pl. Dis. Reptr **63**: 395–399. 1979; in this crop honeybees may also transport the ascospores with infected pollen, see Stelfox, Williams, Soehngen & Topping *in* Pl. Dis. Reptr **62**: 576–579. 1978. A detailed description of the sclerotia, apothecia and microconidial (spermatial) state (*Myrioconium* sp.) of the fungus can be found in Kohn's *Sclerotinia* monograph (l.c.). For descriptions and other data of *S. sclerotiorum* see also Mordue & Holliday *in* C.M.I. Descr. pathog. Fungi Bact. 513. 1976 and Domsch, Gams & Anderson l.c.

SCLEROTIUM CEPIVORUM Berk.

Sclerotium cepivorum Berkeley *in* Ann. Mag. nat. Hist. **6**: 359. 1841.

≡ *Stromatinia cepivora* (Berk.) Whetzel *in* Mycologia **37**: 674. 1945 [as '*cepivorum*'; see note].

Note: *S. cepivorum* is the causal organism of a most serious disease of onion: White Rot. It also affects, though to a lesser extent, leek and various other cultivated and wild species of *Allium*. It has also been recorded on plants of other genera, but under field conditions the hosts are apparently restricted to the genus *Allium*. The fungus is characterized by the production of small, black spherical sclerotia [about 0.5 mm diam], which can survive for several years in soil in the absence of host plants. A phialidic spermatial state (*Myrioconium* sp.) is usually present, but a perfect state has never been found. Whetzel's transfer of *S. cepivorum* to the ascomycetous genus *Stromatinia* was based only on similarity of the sclerotia for those seen in *Stromatinia gladioli* (Drayt.) Whetzel [causal organism of Dry Rot of gladiolus and allies]. The sclerotia of *S. cepivorum* germinate directly to mycelium in response to exudates produced by *Allium* roots: once the plant is infected further increases in disease occur by mycelial spread between adjacent plants. Infected seedlings usually die at the pre- and post-emergence stages whilst adult plants appear stunted and chlorotic with dense masses of white mycelium colonising the roots, bulbs and stem base. Eventually the bulbs become desiccated and large numbers of sclerotia develop. For full description of the disease symptoms see Butler & Jones, Pl. Path. 703–706. 1949. A detailed description of the fungus in vitro and notes on its biology with many literature reference are given by Mordue *in* C.M.I. Descr. pathog. Fungi Bact. 512. 1976. Various techniques for isolation of sclerotia from soil have been described, see e.g. Utkhede & Rahe *in* Phytopathology **69**: 295–297. 1979 and Adams *in* Pl. Dis. Reptr **63**: 349–351. 1979. For resistence of onions to *S. cepivorum* see Utkhede & Rahe *in* Can. J. Pl. Sci. **58**: 819–822. 1978 and *in* Phytopathology **68**: 1080–1083. 1978. A review of the epidemiology and control methods of the white rot disease has been made by Entwistle & Munasinghe in Scott & Bainbridge, Pl. Dis. Epidemiology 187–191. 1978. Aspects concerning the sclerotial populations in the soil and the incidence of white rot have been studied by Crowe, Hall, Greathead & Baghott *in* Phytopathology **70**: 64–69. 1980 and Crowe & Hall *in* Phytopathology **70**: 70–73 and 74–78. 1980.

SEPTORIA APIICOLA Speg.

Septoria apiicola Spegazzini *in* Boln Acad. nac. Cienc. Córdoba **11**: 297. 1887.

= *Septoria petroselini* var. *apii* Briosi & Cavara *in* Funghi parass. Fasc. 6, No. 144. 1891 [collected by Cavara in 1890].

= *Septoria apii* Chester *in* Bull. Torrey bot. Club **18**: 373. 1891 [often erroneously cited as '*S. a.* (Briosi & Cav.) Chester'].

= *Septoria apii-graveolentis* Dorogin *in* Mater. Mikol. Fitopat. Ross. **1** (4): 72. 1915 [as '*apii graveolentes*'].

Note: This species represents the causal organism of Leaf Spot (Am.: Late Blight) of celeriac and celery. The disease is very common and may be destructive ['Fire blight' of celery; Rogers *in* J. [Dep.] Agric. S. Aust. **72**: 342–345. 1969]. Once it was believed that two distinct species of *Septoria* were responsible for this disease, one causing large definite spots (*S. apii*) and the other small indefinite spots (*S. apii-graveolentis*). However, Gabrielson & Grogan *in* Phytopathology **54**: 1251–1257. 1964 and Sheridan *in* Trans. Br. mycol. Soc. **51**: 207–213. 1968 have established that only one variable species is involved, which was first described as *S. apiicola* from American specimens on a wild celery [*Apium australe* Thouars]. There are discernible differences between the strains causing typical large spots and those causing small spots, but they are only part of a completely integrated series of minor variations occurring within *S. apiicola*. For description of the two types of the fungus, its biology and the disease symptoms see Butler & Jones, Pl. Path. 630–635. 1949. Pycnidia of *S. apiicola* often occur of the 'seed', and this is the chief means of dissemination, see Sheridan *in* Ann. appl. Biol. **57**: 75–81. 1966. For other literature references in respect of the biology, transmission and control of the fungus see Sutton & Waterston *in* C.M.I. Descr. pathog. Fungi Bact. 88. 1966.

THANATEPHORUS CUCUMERIS (Frank) Donk

Thanatephorus cucumeris (Frank) Donk *in* Reinwardtia **3**: 376. 1956.

≡ *Hypochnus cucumeris* Frank *in* Ber. dt. bot. Ges. **1**: 62. 1883.

= *Corticium solani* (Prill. & Delacr.) Bourdot & Galzin *in* Bull. Soc. mycol. Fr. **27**: 248. 1911.

≡ *Hypochnus solani* Prillieux & Delacroix *in* Bull. trimest. Soc. mycol. Fr. **7**: 220. 1891.

stat. myc. *RHIZOCTONIA SOLANI* Kühn

Rhizoctonia solani Kühn, Krankh. Kulturgew. 224. 1858.

= *Moniliopsis aderholdii* Ruhland *in* Arb. [K.] biol. Anst. Land-u. Forstw. **6** (1): 76. 1908.

Note: This ubiquitous soil-borne fungus may cause Damping-off and Root Rot in various field crops, including those treated in this paper. The nomenclature of *T. cucumeris* has already been discussed in Series 1a of the check-list [*in* Neth. J. Pl. Path. **78**, Suppl. 1: 49–50. 1972]. See also check-list 2a and 2c [*in* Neth. J. Pl. Path. **82**: 210–211. 1976 and **85**: 175. 1979]. Literature on this fungus up to 1965 has been summarized by Parmeter, Biol. Pathol. Rhizoctonia solani [Proc. Symposium] 1970 [255 pp.]. For descriptions of both states and data on hosts, disease symptoms, pathogenicity and biology see Mordue *in* C.M.I. Descr. pathog. Fungi Bact. 406. 1974 and Tu & Kimbrough *in* Bot. Gaz. **139**: 454–466. 1978. Induction of the perfect state in vitro has been treated more recently by Tu & Kimbrough *in* Phytopathology **65**: 730–731. 1975. See also the discussion of this fungus in Domsch, Gams & Anderson, Compendium Soil Fungi 765. 1980.

UROCYSTIS CEPULAE Frost

Urocystis cepulae Frost apud Farlow *in* Rep. Secr. Mass. St. Bd Agric. **24**: 178. 1877.

≡ *Tuburcinia cepulae* (Frost) Liro *in* Annls Univ. fenn. åbo. A, **1** (1): 47. 1922.

= *Urocystis colchici* var. *cepulae* Cooke *in* Gdnrs' Chron. II, **7**: 735. 1877.

Note: In North American phytopathological literature this Smut of onion and leek is on the authority of Fisher, N. Am. Smut Fungi 213–214. 1953 usually erroneously indicated as *Urocystis colchici* (Schlecht.) Rabenh. The latter, occasionally occurring on *Colchicum* spp., is on account of the morphology of the spore-balls easy to distinguish from *U. cepulae* which does not attack plants other than species of *Allium*, see Chupp *in* Mycologia **52**: 343–345. 1960 and Boerema & Valckx *in* Gewasbescherming **1**: 67. 1970. Infection by *U. cepulae* from spore-balls in the soil can take place only through the cotyledon of the plant. Once inside, it spreads between the cells in all directions, and pockets of black spore-balls soon begin to develop. Some affected seedlings may suffer so severely that they are killed outright. In the soil the spore-balls may remain viable for an indefinite number of years. Sets and transplants form the main means of dispersal. For detailed description of the fungus, its biology and the disease symptoms see Butler & Jones, Pl. Path. 699–703. 1949. See also

Mulder & Holliday *in* C.M.I. Descr. pathog. Fungi Bact. 298. 1971, who provide more recent information on the biology of this smut.

VERTICILLIUM ALBO-ATRUM Reinke & Berth.

Verticillium albo-atrum Reinke & Berthold *in* Unters. bot. Lab. Univ. Göttingen **1**: 75. 1879.

Note: *V. albo-atrum* is one of the two fungi causing Verticillium Wilt of a large number of plants, including some vegetables grown as field crops. The other fungus, *V. dahliae* Kleb. (q.v.), is apparently more often involved in Verticillium wilt of field crops; however, the two species have not always been differentiated. Both fungi have also been treated in check-list 2a and 2c [*in* Neth. J. Pl. Path. **82**: 211–212. 1976 and **85**: 181. 1979]. Hosts have been listed by Engelhard *in* Suppl. Pl. Dis. Reptr **244**. 1957. A review on the extensive literature of Verticillium Wilt is given by Pegg *in* Rev. Pl. Path. **53**: 157–182. 1974. For description of *V. albo-atrum* see Hawksworth & Talboys *in* C.M.I. Descr. pathog. Fungi Bact. 255. 1970. See also Domsch, Gams & Anderson, Compendium Soil Fungi 830. 1980.

VERTICILLIUM DAHLIAE Kleb.

Verticillium dahliae Klebahn *in* Mycol. Centbl. [Mycol. Zentbl.] **3**: 66. 1913.

Note: This species is most often associated with Verticillium Wilt in field crops, see the note under *V. albo-atrum* Reinke & Berth. A good description of *V. dahliae* is given by Hawksworth & Talboys *in* C.M.I. Descr. pathog. Fungi Bact. 256. 1970. See also Domsch, Gams & Anderson, Compendium Soil Fungi 836. 1980.

Index of fungus names

The selected names are in boldface type.