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REMARKS ON SPECIES OF PHOMA REFERRED TO PEYRONELLAEA—IV

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The new combination *Cheiromycella chomatospora* (Corda) is proposed for the species described by Corda as *Coniothecium chomatosporum*, a name later often misapplied. The new combination *Phoma sorghina* (Sacc.) is introduced for the species discussed in a former paper under the misapplied name *Phoma glumarum* Ell. & Tracy.

Questions of synonymy and misapplications are the greatest obstacles to the revision of the taxonomy of *Phoma*-like fungi. In this fourth article on '*Peyronellaea*' (compare Boerema & al., 1965, 1968, 1971) certain misapplied names and additional synonyms are discussed.

PHOMA GLOMERATA (Corda) Wollenw. & Hochapf.

MISIDENTIFICATIONS: *Coniothecium chomatosporum* Corda not sensu Corda: Tryon *apud* Jarvis *in* Qd agric. J. **18**: 269–271. 1922. — *Peyronellaea chomatospora* (Corda not sensu Corda) Goid. *in* Atti Accad. naz. Lincei Rc. VIII **1**: 455. 1946 (as '*cromatospora*', not validly published).
Coniothecium scabrum McAlp. not sensu McAlp.: Wiltshire *apud* Mason *in* Mycol. Pap. **2** (2): 1–14. 1933. — *Peyronellaea scabra* (McAlp. not sensu McAlp.) Goid. *in* Atti Accad. naz. Lincei Rc. VIII **1**: 455. 1946 (not validly published).
DIAGNOSTIC CHARACTERISTICS IN VITRO: described *in* Persoonia **4**: 53–54. 1965.

In our first paper on dictyochlamydospore-producing species of *Phoma* (Boerema & al., 1965) it was pointed out that Goidànich (1946) had incorrectly interpreted *Coniothecium chomatosporum* Corda and *Coniothecium scabrum* McAlp. as members of 'Peyronellaea'. Further study of the literature has confirmed this.

In various parts of the world *Coniothecium chomatosporum* was formerly regarded as a serious pathogen of apple (Argentina: Fernández Valiela & al., 1954; Australia: Osborn & Samuel, 1922; Ceylon: Park, 1941; Denmark: Gram & al., 1927; England: Massee, 1915, Pethybridge, 1926, Wormald, 1929, 1930, Moore, 1931; India: Kheswalla, 1936, Dey & Singh, 1939, Singh, 1942, 1943, Padwick, 1945; New Zealand: Cunningham, 1925; Rhodesia: Hopkins, 1937; South Africa: Anonymous, 1921, 1922) and, in milder form, also of pear (Argentina: Fernández Valiela & al, 1954; Australia: Osborn & Samuel, 1922;) and plum (India: Kheswalla, 1936; Padwick, 1945). The fungus was said to cause symptoms of scab, canker and blister on twigs and stems ('rough scab', 'apple bark canker', 'apple branch blister', 'apple blackstem'), often resulting in the death of the trees. Cracking, russeting, spotting

and rot of apple fruits were also ascribed to this fungus. All these disease symptoms are now considered to be non-parasitic in origin (Wormald 1934, 1935; Moore & al., 1939; Moore & Bennett, 1952; Mathur, 1968); they are caused by rootstock and soil conditions (e.g. by soils deficient in water and potash).

Coniothecium chomatosporum is now known to be a very common dematiaceous hyphomycete, widespread, and occurring on dead bark and wood of trees. The original description and figures of *C. chomatosporum* (Corda, 1837) on dead wood of pine demonstrate that it is conspecific with the type species of *Cheiromycella* Höhn., *Ch. speiroidea* (Höhn.) Höhn. (1910), described from dead wood of conifers and at present known as *Ch. microscopica* (P. Karst.) Hughes (1958). Since the specific epithet *chomatosporum* antedates all other names of this species (see Hughes, 1958) we propose the following recombination: **Cheiromycella chomatospora** (Corda) Boerema, Dorenb. & v. Kest., *comb. nov.* (basionym, *Coniothecium chomatosporum* Corda, Icon. Fung. **1**: 2, pl. 1 fig. 22. 1837). The characteristic features of the fungus in vivo have recently been illustrated by Ellis (1971: 325). For its characters in culture see Dey & Singh (1939).

In Australia a dictyochlamydospore-producing *Phoma* species was erroneously identified as *Coniothecium chomatosporum* (Tryon *apud* Jarvis, 1922). Based on this misidentification Goidànich appears to have proposed the recombination *Peyronellaea chomatospora*, but without validly publishing it. From the studies of Togliani (1952), Foschi (1956), Porreye (1961), and Mathur (1968) it is known that the ubiquitous *Phoma glomerata* very often occurs in association with the disease symptoms of apple mentioned above. It would therefore seem plausible to assume that Tryon's dictyochlamydospore-producing *Phoma* species is referable to *P. glomerata*.

In South Africa van der Bijl (1916) also obtained a dictyochlamydospore-producing *Phoma* species from apple twigs with disease symptoms ascribed to *Coniothecium chomatosporum*. The cultural and morphological characters of van der Bijl's fungus agree completely with those of *Phoma pomorum* (see below), incidentally a species also found by Mathur (1968 and personal communication) in association with the above mentioned disease.

Coniothecium scabrum has been described as the causal organism of a certain type of injury of the skin of *Citrus* fruits, called 'black scurf' (Australia: McAlpine, 1899; Samuel, 1925; S. Africa: Putterill, 1923). It is now known that the relevant faint scabbing or russeting of the skin is due to thrips or other injury while the fruit is developing and subsequently to the growth of secondary fungi which emphasize and discolor the injured areas (Fawcett, 1936: 561, 572).

The original description and figures of *Coniothecium scabrum* McAlp. (1899) do not differ essentially from the characteristics of the widespread *Cheiromycella chomatospora* (≡ *Coniothecium chomatosporum*); according to Fawcett l.c. this may also be found in association with the 'black scurf' of *Citrus*. In our opinion therefore it seems quite possible that *Coniothecium scabrum* is conspecific with *Cheiromycella chomatospora*.

In a paper by Mason (1933) Wiltshire misapplied the name *Coniothecium scabrum*

to a dictyochlamydospore-producing species of *Phoma* isolated from orange fruit. On this misidentification Goidànich based the combination *Peyronellaea scabra*, but this was not validly published. Close examination of the figures in Mason's paper convinced us that it is beyond doubt that Wiltshire's fungus pertains to *Phoma glomerata*. The study of Pupillo (1952) has proved that *P. glomerata* occurs on *Citrus* fruits (see Boerema & al., 1965: 59).

PHOMA POMORUM Thüm.

MISIDENTIFICATIONS: *Ascochyta gossypii* H. Syd. not sensu H. Syd.; Chippendale *in* Trans. Br. mycol. Soc. **14**: 201–214. 1929.

Coniothecium chomatosporum Corda not sensu Corda; Bijl *in* Rep. S. Afr. Ass. Advmt Sci. **1915** (13th annual meeting): 649–657. 1916.

Phoma mali Schulzer & Sacc. not sensu Schulzer & Sacc.; Bijl *in* Rep. S. Afr. Ass. Advmt Sci. **1915** (13th annual meeting): 649–657. 1916.

DIAGNOSTIC CHARACTERS IN VITRO: described *in* Persoonia **4**: 60. 1965 under the synonym *Phoma prunicola* (Opiz) Wollenw. & Hochapf.

Ascochyta gossypii Woronich. (= *A. gossypii* H. Syd.) is the causal organism of the 'wet weather blight' of cotton (leaf spot and stem canker). In our first paper in this series (Boerema & al., 1965) it was pointed out that isolates of this species do not produce dictyochlamydospores like those described and illustrated by Chippendale (1929). Further studies showed that the 'wet weather blight'-fungus deviates completely from the fungus described by Chippendale, not only in cultural (see Thompson, 1950) but also in morphological characters. Chippendale had based his studies on a single tube culture ("having already been opened") made from a diseased cotton plant he had received from North Carolina, U.S.A. Inoculation of the fungus on cotton plants was stated to be "uniformly unsuccessful," whereas the true *A. gossypii* is known to be strongly pathogenic to cotton (compare Holliday & Punithalingam, 1970). The true *A. gossypii* is characterized by, among other things, relatively large pycnidiospores, 8–12 μ (mostly 10–12 μ) long and 2.5–4 μ broad. Chippendale's fungus produced much smaller spores: 5.7 × 3 μ. These spore dimensions as well as the description and figures of pycnidia, chlamydospores and dictyochlamydospores ("hypocysts") given by Chippendale fully agree with those of *Phoma pomorum*. Furthermore the growth characteristics on various media of Chippendale's fungus proved to be in accordance with those of *P. pomorum* on the same media. In our experience plurivorous weakly parasitic species of *Phoma* are often confused with the specialized parasites among the species of *Phoma*. *Phoma pomorum*, a ubiquitous weak parasite, is a case in point [compare Maas, 1965: 116; confusion between *P. pomorum* (syn. *Peyronellaea nicotiae* Leduc) and the footrot fungus of flax: *Phoma exigua* var. *linicola* (Naoum. & Vass.) Maas (syn. *Ascochyta linicola* Naoum. & Vass.)]. Another ubiquitous weak or wound parasite is *Phoma exigua* Desm. (Boerema & Höweler, 1967). In our opinion some of the supposed "*Ascochyta gossypii*"-isolates made in North Carolina by Crossan (1958) are likewise different from the true *A.*

gossypii and are very probably referable to this *Phoma exigua* Desm. (compare Boerema, 1972).

Another species which has also been confused with *Phoma pomorum* is *Cheiromycella chomatospora* (≡ *Coniothecium chomatosporum*), discussed above under *P. glomerata*. This is apparent from a study by van der Bijl (1916) in South Africa. Van der Bijl gave descriptions and illustrations of "*Coniothecium chomatosporium* Corda, isolated from diseased apple twigs, where the fungus produces a blister disease," that agree completely with those of *P. pomorum*. Apart from *Phoma*-pycnidia the cultures showed "intercalary chlamydospores," "*Alternaria*-like spores" and "packets of *Coniothecium*-spores," which areintermediate stages between chlamydospores and dictyochlamydospores. Van der Bijl (l.c.) stated that the pycnidia, "judging by the spore characters, evidently belong to *Phoma mali* Schulz. & Sacc." This name was obviously adopted from a paper by Massee (1915), who believed that *Coniothecium* is a stage in the life cycle of *Diaporthe ambigua* Nitschke (= *D. eres* Nitschke, fide Wehemyer, 1933). At that time this pycnidial state was known as *Phoma mali* Schulzer & Sacc. The latter is a typical *Phomopsis* and was accordingly named *Phomopsis mali* (Schulzer & Sacc.) Died., a later homonym and synonym of *Phomopsis mali* Roberts (see Boerema & Verhoeven, 1973). The pycnidia described and illustrated by van der Bijl (l.c.) are true *Phoma*-pycnidia with undifferentiated sporogenous cells, corresponding completely with those of *P. pomorum* Incidentally Mathur (1968 and personal communication) also isolated *P. pomorum* [= *P. prunicola* (Opiz) Wollenw. & Hochapf.] from apple branch blister in Iraq (appel black stem).

PHOMA JOLYANA Pirozynski & Morgan-Jones

ADDITIONAL SYNONYM: *Phoma jolyi* Morelet *in* Bull. Soc. Sci. nat. Archéol. Toulon Var **177**: 9. 1968.

DIAGNOSTIC CHARACTERS IN VITRO: described *in* Persoonia **4**: 63. 1965 under the synonym *Phoma musae* (Joly) Boerema & al.

Almost simultaneously with Pirozynski & Morgan-Jones' publication of *Phoma jolyana* Morelet proposed the new name *Phoma jolyi* to replace *Phoma musae* (Joly) Boerema & al. (non *Phoma musae* Sacc.). The binomial *Phoma jolyana* dates from 25 June 1968, whereas *Phoma jolyi* was published in July 1968 (personal communication Dr. Morelet).

Phoma sorghina (Sacc.) Boerema, Dorenb. & v. Kest., *comb. nov.*

Phyllosticta sorghina Sacc. *in* Michelia **1** (2): 140. 1878 (basionym).
Phyllosticta sacchari Speg. *in* Revta Fac. Agron. Univ. naz. La Plata **2**: 239. 1896.
Phoma insidiosa Tassi *in* Boll. R. Orto bot. Siena **1**: 8. 1898.
Phyllosticta setariae Ferr. *in* Malpighia **16**: 18. 1902.
Phyllosticta glumarum-sorghi P. Henn. *in* Annls Mus. r. Congo belge Sér. 4to, Bot. V **2**: 101. 1907.
Phyllosticta glumarum-setariae P. Henn. *in* Annls Mus. 2. Congo belge Sér. 4to, Bot. V **2**: 101. 1907.

Phyllosticta phari Speg. *in* An. Mus. nac. Hist. nat. B. Aires III **13** (= **20**): 337. 1910 (preprint; vol. dated 1911).

Phyllosticta penicillariae Speg. *in* An. Mus. nac. Hist. nat. B. Aires **26**: 129. 1914 (preprint; vol. dated 1915).

Phyllosticta hawaiiensis Caum *in* Hawaii Plrs' Rec. **20**; 278. 1919.

MISAPPLICATION: *Phoma glumarum* Ellis & Tracy not sensu Ellis & Tracy: Boerema, Dorenbosch & van Kesteren *in* Persoonia **6**: 174–176. 1971.

DIAGNOSTIC CHARACTERS IN VITRO: described *in* Persoonia **5**: 203. 1968 under the synonym *Phoma indianensis* (Deshpande & Mantri) Boerema & al.

This is a ubiquitous species in tropical and subtropical regions. It may occur on all kinds of plants and other substrata (Boerema & al., 1968 under the synonym *Phoma indianensis*), but more particularly the fungus appears to be a common weak parasite of Gramineae. It is not only well known from rice (*Oryza sativa*) (Boerema & al., 1971 under the misapplied name '*Phoma glumarum*') but it also attacks such important gramineous crops as sorghum (*Sorghum vulgare*), with its varieties (e.g. 'Brown durra', 'Sudan grass', 'Sweet sorghum'), sugar cane (*Saccharum officinarum*) and wheat (*Triticum aestivum*). In phytopathological literature on these crops the fungus is usually treated under the names *Phoma insidiosa* Tassi (e.g. Koch & Rumbold, 1921; Rumbold & Tisdale, 1921a,b; Saccas, 1954; Nema & al., 1971; Punithalingam & Holliday, 1972) and *Phyllosticta sorghina* Sacc. (e.g. Bourne, 1934; Sprague 1941, 1950 and Anonymous, 1960). Two isolates from sorghum (IMI 139349 and IMI 140622 under the name *Phoma insidiosa*), one isolate from sugar cane (CBS 288.35 = ATCC 12115 under the name *Phyllosticta sorghina*, isol. made by Bourne, 1934) and two isolates from wheat obtained from Prof. K. G. Nema, J. N. Agricultural University, Jabalpur, India (see Nema & al., 1971) and Dr. W. F. O. Marasas, Plant Protection Research Institute, Pretoria, S. Africa, showed the typical cultural characters we described earlier (Boerema & al., 1968, under the synonym *Phoma indianensis*). The cultural characters described by Koch & Rumbold (l.c.) for *Phoma insidiosa* and by Bourne (l.c.) for *Phyllosticta sorghina* also accord with our observations of the fungus in vitro.

Saccardo's *Phyllosticta sorghina* antedates *Phoma insidiosa* Tassi; further it turned out that so far it is the oldest known valid name for this typical dictyochlamydospore-producing *Phoma*-species. Consequently it has been transferred to the genus *Phoma*.

The other synonyms listed above are adopted from the comparative cultural and morphological studies by Bourne (l.c.) and Sprague (1941). They can be added to the synonyms discussed in our previous papers (Boerema & al., 1968, 1971), viz. *Phoma glumicola* Speg. ≡ *Phyllosticta glumicola* (Speg.) Hara, *Phyllosticta glumarum* Sacc. ≡ *Phyllosticta oryzina* Padw., *Phoma depressitheca* Bub., *Phoma chartae* Verona, *Peyronellaea indianensis* Deshpande & Mantri ≡ *Phoma indianensis* (Deshpande & Mantri) Boerema & al.

Apart from rice, sorghum, sugar cane and wheat various other gramineous hosts are mentioned in literature (generally under *Phyllosticta sorghina*), e.g.: common reed (*Phragmites communis*), 'Johnson grass' (*Sorghum halepense*), maize (*Zea mays*), millet (*Pennisetum typhoides*), and species of *Eragrostis*, *Chloris*, *Panicum*, *Pharus*, *Setaria*,

Rhynchelytium and *Tricholaena* (Anonymous, 1960; Boughey, 1946, Bourne, l.c.; Koch & Rumbold, l.c. and Sprague, 1941, 1950, 1958, 1960, 1962). The disease symptoms on these gramineous hosts are generally similar: infection of the seeds ('glume blotch', -blight') and spots on leaves and stems (compare Boerema & al., 1971, Nema & al., 1971 and Punithalingam & Holliday, 1972).

The binomial *Phoma glumarum* as used in our previous paper (Boerema & al., 1971) for this fungus is not correct. *Phoma glumarum* had been described by Ellis & Tracy (apud Ell. & Ev., 1888: 123) but as we were under the impression that the original material was no longer in existence we chose another collection as neotype (Boerema & al., 1971). This is the specimen "on glumes of *Oryza sativa*, Ocean Springs, Mississippi, Sept. 1889," identified by S. M. Tracy himself and preserved at BKL. There is no doubt that this material and the fungus we described represent the same species but the choice of a neotype was superfluous. Dr. C. T. Rogerson kindly informed us (letter of January 1972) that the Ellis herbarium (NY) contained "two packets bearing the holotype data exactly as published: *Phoma glumarum* Ell. & Tracy, on living glumes of *Oryza sativa*, Starkville, Miss., Oct. 1888, Tracy No. 122." Unfortunately this material does not conform with the collection in BKL; it represents a species of *Coniothyrium*. Hence the binomial used in our paper (l.c.) is a misapplication.

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