LYCOPERDACEAE–GASTEROMYCETES

TAXONOMIC AND NOMENCLATURAL NOTES ON BOTTOMLEY'S 'DOUBTFUL, UNKNOWN AND INSUFFICIENTLY DESCRIBED' SPECIES OF *LYCOPERDON*

INTRODUCTION

In her catalogue of South African Gasteromycetes, Bottomley (1948) listed nine species of *Lycoperdon* Pers.: Pers. as 'doubtful, unknown and insufficiently described'. During a recent taxonomic revision of the related genus *Calvatia* Fr. in southern Africa (Coetzee 2006), the opportunity arose to study the type material and more recent literature pertaining to most of these 'doubtful' members of *Lycoperdon*. Of the nine species in Bottomley's list, five could be indentified to species and two to at least generic level. The identities of only two entries remain completely unresolved.

As in our previous paper on Bottomley's Gasteromycetes (Coetzee *et al.* 1997), the order of arrangement of the taxa enumerated below follows Bottomley (1948). Author citations have, however, been abbreviated in accordance with Brummitt & Powell (1992). The number in square brackets at the end of each heading refers to the relevant page number in Bottomley (1948) and it is followed by an indication of the identity of the particular taxon in as far as we could clarify it.

With the exception of the type of *Lycoperdon capense* Fr., which was received on loan from UPS, all other type specimens were examined macro- and microscopically during two visits to the mycological herbarium of the Royal Botanic Gardens at Kew. Glebal and peridial fragments of all specimens were mounted in clear Amann's lactophenol and Amann's lactophenol with aniline blue and observed under an Olympus CHK light microscope at K (brightfield only) and a Reichert-Jung Polyvar instrument in the senior author's own laboratory (brightfield, interference contrast, phase contrast and dark-field).

ANNOTATED LIST OF TAXA

1. Lycoperdon asperrimum *Welw. & Curr.* in Transactions of the Linnean Society of London 26: 289 (1868). [562; **Vascellum asperrimum** *(Welw. & Curr.) Kreisel*]

TYPE.—Angola, Mossamedes Dist., 'in dumetosis arenosis ad marginem de Lagoa de Giraul, locis subsalsis', *Welwitsch 142*, July 1859 (K, holo.!).

After having studied the types of both *Lycoperdon asperrimum* and *L. angulatum* Dissing & M.Lange, Demoulin & Dring (1975) concluded that *L. angulatum* was a later synonym of *L. asperrimum*. Based on the original description of *L. angulatum*, as well as an examination of both the *L. asperrimum* holotype and an 'ex type' specimen of *L. angulatum* at K, the current authors are not fully convinced of this synonymy, an opinion based primarily on capillitial differences. In capillitial morphology the *L. angulatum* material at K differs from the original description of that fungus in Dissing & Lange (1962) by virtue of its considerably smaller diameter and apparent lack of septa. Furthermore, the original *L. angulatum* description (capillitium pale brownish violet, septate, branched, pitted) does not agree with the *L. asperrimum* holotype which has unbranched, non-pitted capillitium as described below. Although there is no evidence in the folder at K or in his own paper of having examined any type material, Kreisel (1993) concurred with Demoulin & Dring (1975) regarding the synonymy of the two species. He treated *L. asperrimum* in the genus *Vascellum* F.Šmarda as [*Vascellum asperrimum* (Welw. & Curr.) Kreisel], we assume on account of the distinct diaphragm as described in Dissing & Lange (1962). Visually the diaphragm in the *L. asperrimum* holotype is not well defined but its presence can be detected when a needle is drawn upwards across the subglebal tissue as described in Homrich & Wright (1988). True capillitium is present but sparse, thin-walled, aseptate, unbranched and without perforations under the light microscope. On the basis of our observations we have little reason to dispute Kreisel's (1993) appointment of *L. asperrimum* to the genus *Vascellum*. Its purported synonymy with *L. angulatum*, however, needs further investigation, although it will not affect the name or status of *V. asperrimum*.

Note: Ponce de León (1970) also transferred *L. angulatum* to the genus *Vascellum*, as *Vascellum angulatum* (Dissing & M.Lange) P.Ponce de León.

2. Lycoperdon bicolor *Welw. & Curr.* in Transactions of the Linnean Society of London 26: 290 (1868). [562; **identity unresolved**]

TYPE.—Angola, Huilla Dist. between Lopollo and Empalanea, 'in pascuis humidiusculis silvaticis, 3800–5500 ped. elevat.', *Welwitsch 146*, May 1860 (K, holo.!).

Demoulin (1971) was of the opinion that *Lycoperdon bicolor* probably represented a good species, to which Demoulin & Dring (1975) also assigned a collection from Rwanda. According to the latter authors, the Rwanda material had a well-developed diaphragm, on account of which Kreisel (1993) transferred this fungus to the genus *Vascellum* as *V. bicolor* (Welw. & Curr.) Kreisel. The type specimen at K consists of an intact specimen from which the presence or absence of a diaphragm is not readily observable. If the material from Rwanda is not conspecific with the original collection from Angola, a possibility acknowledged by Demoulin & Dring (1975), then Kreisel's treatment of *Lycoperdon bicolor* as a *Vascellum* would need to be reassessed. Detailed re-examinations of both collections are required to confirm or refute both their conspecificity and Kreisel's designation.

3. Lycoperdon capense *Cooke & Massee* in Massee in Journal of the Royal Microscopical Society 1887: 714, t. 12, figs 4, 5 (1887). [563; **identity partly resolved**: not a *Lycoperdon* or *Bovista*, most probably a **Calvatia** *Fr.*]

TYPE.—Cape of Good Hope, on the ground. [holo.†(?); t. 12, fig. 4, 5 in Massee (1887)!, lecto., here designated].

Note: neither Bottomley (1948) nor Demoulin (1971) was able to locate the type and a recent search by the first author at K also failed to find it. The type is therefore assumed to be missing. The figures in Massee (1887) thus become the obligatory lectotype.

The compact sterile base (Massee 1887) excludes this species from *Lycoperdon*, the lack of a diaphragm separates it from *Vascellum* and the unbranched capillitium of uniform diameter indicates that it is not a *Bovista* either. According to the original description, and on the basis of elimination of other possibilities, this is most probably a *Calvatia*, approximating *C. candida* and *C. rugosa*. Massee's (1887) illustration is of little diagnostic value, however, and in the absence of the original material we are reluctant to formally assign it to that genus. Should the type be found, however, and it proves to be a good species, a name change will be inevitable since *L. capense* Cooke & Massee is a later homonym of *L. capense* Fr.

4. Lycoperdon capense *Fr.*, J.A. Wahlbergii Fungi natalenses, adjectis quibusdam capensibus: 30 (1848). [563; mixed collection: **Bovista capensis** *(Fr.) J.C.Coetzee & A.E.van Wyk* and **Calvatia**, sp. nov.]

TYPE.—South Africa, Promontorium Bonae Spei (Cape of Good Hope), Uitenhage, *Zeyher 106a*. (Herb. E. Fries in UPS!, lecto.).

Lycoperdon capense Fr. is known from the type collection only, but as has been reported elsewhere (Kreisel 1967; Coetzee & Van Wyk 2005), Zeyher's original material (*Zeyher 106 sub herb. E. Fries* at UPS) represents a mixed collection, the two elements of which have been separated and which are filed in separate folders in UPS as *Zeyher 106a* and *106b* respectively. Kreisel (1967) assigned *Zeyher 106a* to *Bovista promontorii* Kreisel, but Coetzee & Van Wyk (2005) selected this component of *Zeyher 106* as lectotype for *Lycoperdon capense* Fr., which actually is a *Bovista*, correctly named *B. capensis* (Fr.) J.C.Coetzee & A.E.van Wyk.

Zeyher 106b represents an undescribed, but not at all uncommon, South African species belonging to *Calvatia* sect. *Macrocalvatia* Kreisel *sensu* Coetzee & Van Wyk (2003).

The specimen in the *Lycoperdon capense* Fr. type folder at K, also '*Zeyher 106*' from Uitenhage, lacking a true capillitium and opening with a pore, is not a *Calvatia* and is here tentatively assigned to *Vascellum*.

Note: as explained elsewhere (Coetzee & Van Wyk 2005; Glen & Germishuizen 2010) the numbers on Zeyher specimens can be a source of confusion. In some cases it may represent Zeyher's collecting number but, more often, it refers to the collecting locality. Therefore, specimens from the same locality may all carry the same number, yet belong to different gatherings, as seems to be the case with *Zeyher 106*. Locality 106 is listed in Glen & Germishuizen (2010) as 'Uitenhage, Zuureberg, 2–3000'. [In addition to the specimens already mentioned, *Zeyher 106* also consists of a fourth component, studied by Demoulin (1972) at K, on which Berkeley (1843) based the genus *Scoleciocarpus* (= *Arachnion* Schwein.) and species *Scoleciocarpus tener* Berk.]

5. Lycoperdon curreyi *Massee* in Journal of the Royal Microscopical Society 1887: 706 (1887). [563; **Calvatia cyathiformis** *(Bosc) Morgan*]

Replaced synonym: *Lycoperdon radicatum* Welw. & Curr. in Transactions of the Linnean Society of London 26: 289 (1868), non Durieu & Mont. in Durieu de Maisonneuve: 383 (1848).

TYPE.—Angola, Dist. Loanda, near Penedo, *Welwitsch 116*. (K, holo.!).

Massee (1887) established this new name for *Lycoperdon radicatum* Welw. & Curr. because the latter was a later homonym of *L. radicatum* Durieu & Mont. After microscopic examination of the holotype at K, however, the current authors are left with no doubt that, on the basis of glebal and endoperidial similarity in particular, *Lycoperdon curreyi* Massee is just another synonym of *Calvatia cyathiformis* (Bosc) Morgan. Apart from the type material, Bottomley (1948) cites six additional collections of *L. curreyi* from South Africa. At least two of these [*MacOwan 1004* (*PREM22062*) and *MacOwan 1009* (*PREM22061*)] do not belong to *C. cyathiformis*, however, but to yet another new South African *Calvatia* species to be described elsewhere.

6. Lycoperdon gardneri *Berk.* in Berkeley & Broome in Journal of the Linnean Society, Botany. London 14: 79 (1873). [564; **Calvatia pyriformis** *(Lév.) Kreisel*]

TYPE.—Sri Lanka, Peradeniya, in shady places, *Gardner 9*, May 1844. (K, holo.!).

On the basis particularly of its very characteristic ornamented oval spores, there can be no doubt that *Lycoperdon gardneri* Berk. is merely a synonym of *Calvatia pyriformis* (Lév.) Kreisel, as had been concluded also by Kreisel (1992, 1994).

Bottomley (1948) listed this fungus on the strength of Massee's (1887) statement that it occurred in South Africa. What that statement was based on remains a mystery, however, and a search at K provided no evidence in support of the purported occurrence of this fungus in South Africa. The *Calvatia gardneri* file at K contains only three relatively recent southern African collections, one each from South Africa, Zambia and Malawi. Not one of them is *Calvatia pyriformis*, however, and the occurrence of this fungus in South Africa therefore remains unconfirmed.

7. Lycoperdon glabellum *Peck* in Report (Annual) of the New York State Museum of Natural History by the Regents of the University of the State of New York 31: 39 (1878). [564; **identity unresolved**]

TYPE.—USA, New York State, Rensselaer County, North Greenbush, on ground in copses and in pine woods. *C.H. Peck note no. 710*, autumn. [NYS, lecto., vide Demoulin (1979)].

According to Demoulin (1979), *Lycoperdon glabellum* is probably a synonym of *L. molle* Pers.: Pers. The single record from South Africa, cited in Kalchbrenner (1882) and Bottomley (1948), could not be found at PREM or K, however, and the status of the South Afri-

can '*Lycoperdon glabellum*' therefore remains unresolved.

8. Lycoperdon laetum *Berk.* in Hooker's Journal of Botany and Kew Garden Miscellany 2: 519 (1843). [565; **Vascellum** sp.]

TYPE.—South Africa, Uitenhage, on the ground, *Zeyher 103*, October. (K, holo.!).

According to Demoulin (1971) this is a *Calvatia*. A re-examination of the type revealed the presence of paracapillitium and the absence of capillitium, however, and it must therefore be excluded from *Calvatia* and *Lycoperdon*. It is here considered a member of the genus *Vascellum*, the species determination of which is yet to be resolved.

9. Lycoperdon natalense *Fr.*, J.A. Wahlbergii Fungi natalenses, adjectis quibusdam capensibus: 30 (1848). [565; **Calvatia cyathiformis** *(Bosc) Morgan*]

TYPE.—South Africa, Natal, *J.A. Wahlberg s.n.* [holo.†(?), not in UPS (Dr S. Ryman pers. comm., UPS)].

Although Demoulin (1971) considered this to be a *Calvatia*, he regarded it as 'difficult' to identify to species. The original description of *L. natalense* is cryptic indeed: '*Altera e Terra Natal* L. caelato *affinis, ab hoc differt sporis vinosis l. purpurascentipallidus*' [= akin to *Lycoperdon cealatum* (= *Calvatia utriformis*) but differing in respect of its vinaceous or pale purplish spores]. Although the original material does not seem to exist anymore, the description is unambiguous. If it was similar to *Calvatia utriformis*, as claimed by Fries (1848), it must have possessed a prominent sterile base, and there is only one species in South Africa like that with purple spores, namely *Calvatia cyathiformis*. The authors are therefore quite convinced that *Lycoperdon natalense* Fr., which is known from the original description (Fries 1848) only, should be reduced to synonymy under *Calvatia cyathiformis*.

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