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**Species of *Sowerbyella* in the British Isles, with validation of *Pseudombrophila* sect. *Nannfeldtiella* (Pezizales)**

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Notes on the nomenclature and taxonomy of British taxa of *Sowerbyella* are presented, together with the description of a new variety, *S. radiculata* var. *kewensis*, and a new combination, *S. radiculata* var. *petaloidea*. Three varieties of *S. radiculata* are recognised from the British Isles. In addition, current status of the known taxa of *Sowerbyella* is summarised and a key for their identification provided. A new section in the genus *Pseudombrophila*, *P.* sect. *Nannfeldtiella*, is also validated and a lectotype for *Geopyxis cookei* designated.

**Key words:** *Nannfeldtiella*, nomenclature, *Pseudombrophila* sect. *Sowerbyella*, taxonomy

**Introduction**

*Sowerbyella* Nannf. was erected with two species (Nannfeldt, 1938), *S. radiculata* (Sowerby) Nannf. ( $\equiv$  *Peziza radiculata* Sowerby, type species) and *S. unicolor* (Gillet) Nannf. ( $\equiv$  *Aleuria unicolor* Gillet). More than 30 years later, the latter was shown by Korf (1971) to be a synonym of *S. imperialis* (Peck) Korf ( $\equiv$  *Peziza imperialis* Peck), and a new species, *S. fagicola* J. Moravec (Moravec, 1973), was described. Further species of *Sowerbyella* have been published since (e.g. Harmaja, 1984; Moravec, 1985a,b, 1986, 1988a, 1994; Häffner, 1993) and, currently, 17 species and one variety are referred to the genus. In the British Ascomycetes check-list (Cannon *et al.*, 1985), only one species, *S. radiculata*, was listed. However, Moravec (1985a) cited a British specimen (Graddon 1691, K(M) 30424) as one of the paratypes of *S. crassisculpturata* J. Moravec. Furthermore, an additional species, listed by Cannon *et al.* (1985) as *Svrcekomyces pallidus* Spooner, was also combined in *Sowerbyella* by Moravec (1985b).

During the project ‘Ascomycetes of Great Britain and Ireland’, the type specimen of *Peziza petaloidea* Cooke & W. Phillips, recorded as *Aleuria*

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*petaloidea* (Cooke & W. Phillips) Boud. in Cannon *et al.* (1985), was examined and shown to be a member of *Sowerbyella* (Spooner and Yao, 1995). *Peziza petaloidea* is here considered as a variety of *S. radiculata* with a new combination proposed below. A new variety of *S. radiculata* was also revealed from recent collections made at the Royal Botanic Gardens, Kew, England (and elsewhere) and is described in this paper. Notes on the other names of the genus reported from Britain are provided. Current status of the known taxa of *Sowerbyella* is summarised and a key for their identification is also provided. In addition, a new section under the genus *Pseudombrophila* Boud., originally proposed by van Brummelen (1995), is validated, and a lectotype for *Geopyxis cookei* Masee is designated. *Sowerbyella bauerana* (Cooke) Harmaja is confirmed as a synonym of *S. radiculata*, and *S. parvispora* (Trigaux) J. Moravec is established as a further synonym of this species.

## Taxonomy

***Sowerbyella crassisculpturata*** J. Moravec in *Mycotaxon* **23**: 492 (1985).

= *Sowerbyella radiculata* (Sowerby: Fr.) Nannf. in *Svensk Bot. Tidskr.* **32**: 119 (1938).

Examination of the British specimen (Graddon, 1691) cited by Moravec (1985a) revealed no significant character to distinguish it from other specimens of typical *S. radiculata*. *Sowerbyella crassisculpturata* was separated from *S. radiculata* based on spore ornamentation which in ‘a certain number of mature ascospores is subreticulate, but in the majority of ascospores is verrucose’ (Moravec, 1985a). Ascospores from the British specimen cited by Moravec (1985a) as one of the paratypes for *S. crassisculpturata* measure  $13.5\text{--}15 \times 7.5\text{--}9 \mu\text{m}$ , and are ornamented with irregularly branched, sometimes anastomosing ridges. They are very similar to those of typical *S. radiculata*. The characters emphasised by Moravec (1985a) are considered here not to warrant recognition of *S. crassisculpturata* as a separate species from *S. radiculata*. They are, therefore, treated here as synonyms.

It may be noted that there are two parts of Graddon 1691 housed at the Herbarium, Royal Botanic Gardens, Kew (K). The full information for this collection is: England, Herefordshire, Llangrove, Ross-on-Wye, in a loamy hedgebank, 30 Nov. 1964, W.G. Graddon 1691, K(M)30424a & b.

***Sowerbyella pallida*** (Spooner) J. Moravec in *Mycologia Helvetica* **1**: 431 (1985, as *S. pallidus*).

≡ *Svrcekomyces pallidus* Spooner in *Trans. Brit. mycol. Soc.* **76**: 298 (1981).

≡ *Leucoscypha pallidus* (Spooner) Brumm. in *Libri Botanici* **14**: 87 (1995).

This species was originally placed in *Svrcekomyces* J. Moravec based on its similarity with the type species of that genus, *S. guldeniae* (Svrček) J.

Moravec ( $\equiv$  *Pseudombrophila guldeniae* Svrček), viz. large, fleshy, white apothecia; hyaline, ellipsoid ascospores with strong cyanophilic ornament; iodine-negative asci and distinctive ectal excipulum comprising an outermost hyphal layer overlying a zone of large, thin-walled subglobose cells (Spooner, 1981). However, Moravec (1985b) considered the ascospore ornamentation, shape of apothecia and habitat of this species to be characteristic of *Sowerbyella*. Recently, van Brummelen (1995) transferred the species to *Leucoscypha* Boud., emphasising ‘the habitat, the shape and colour of the apothecia, the structures of excipulum, asci, and spores fit very well with the genus’ as well as the similarity of its hairs with *L. rozei* Boud.

The type species of *Svrcekomyces*, *S. guldeniae*, was considered by Moravec (1976) as ‘rather similar’ and ‘congeneric or even identical’ with *Nannfeldtiella aggregata* Eckblad, the type species of *Nannfeldtiella* Eckblad. Svrček (1981) synonymised *Svrcekomyces* with *Nannfeldtiella*, making the combination *Nannfeldtiella guldeniae* (Svrček) Svrček, but Moravec (1985b) confirmed *P. guldeniae* to be conspecific with *N. aggregata*. It has become clear, therefore, that *Svrcekomyces* and *Nannfeldtiella* are synonyms.

The ascospore ornamentation of *Nannfeldtiella aggregata* was described as ‘non callose-petic’ (cyanophobic) by Eckblad (1968) but, in contrast, was reported as cyanophilic by Korf (1972). Korf also regarded the apothecia of that species as not hairy, again in contrast to Eckblad (1968), speculating that Eckblad had lost the outermost layer of the excipulum in his apothecial sections. Harmaja (1979) transferred the species to *Pseudombrophila* and reduced *Nannfeldtiella* as a synonym of the former. At the same time, Harmaja also suggested *Fimaria* Velen. would prove to be a further synonym. In his monograph of *Pseudombrophila*, van Brummelen (1995) included *Fimaria*, *Nannfeldtiella* and *Svrcekomyces* in the list of generic synonyms, thus broadly expanding the generic concept of *Pseudombrophila*. Twenty-eight species were recognised by van Brummelen (1995), exhibiting various forms of apothecia (e.g. 0.5-28 mm diam. and sessile or short stalked), various colours of disc (e.g. white, to reddish or purplish-brown), hairs scarce to abundant, various structures of excipulum (e.g. *textura globulosa*, *t. angularis* or *t. intricata*), greatly varying ascus length (ranging from 100-300  $\mu\text{m}$ ) and variable number of spores per ascus (4- to 8-spored), various ascospore forms (cylindrical-ellipsoid to globose) and ornament (smooth, finely warted, striate or subreticulate), and a wide range of habitat (fimicolous, foliicolous, lignicolous, terrestrial or pyrophilous). Despite this broad generic concept, van Brummelen (1995) excluded *Svrcekomyces pallidus* from *Pseudombrophila* based on habitat (on wet bare soil amongst hepatics), large apothecia (up to 20 mm diam.) with short stipe and smooth margin, colour of receptacle and disc (white

without amorphous reddish-brown pigment), surface hairs and cell structure of the excipulum (thick layer of hyaline hyphoid hairs and a textura porrecta near the margin), length of asci (280-315 µm), and ascospores (biguttulate and with isolated warts).

The genus *Leucoscypha* was introduced by Boudier (1885) for two species, *Peziza leucotricha* Alb. & Schwein. ( $\equiv$  *L. leucotricha* (Alb. & Schwein.: Fr.) Boud., the combination not made at the time of publication of the genus), and *L. rozei*. Three more species were later referred to the genus by Boudier (1907). However, Le Gal (1957) recognised only *L. leucotricha* and *L. erminea* (E. Bommer & M. Rousseau) Boud. in the genus, and considered *L. rozei* a member of *Melastiza*, for which a combination was made by Yao and Spooner (1995).

In assessing an appropriate generic position for *Svrcekomyces pallidus*, it has been found in the present study that most of the characters of this species fall within the broad concept of *Pseudombrophila* as circumscribed by van Brummelen (1995). Although the combination of white disc and warty spores makes it difficult to place it in either of the two sections he proposed, a position in *Leucoscypha* as circumscribed by Le Gal (1957), a concept largely accepted by the present authors (Yao and Spooner, 1995), is also inappropriate for *Svrcekomyces pallidus* as proposed by van Brummelen (1995). The generic position for this species remains unclear, but species closely related to it have been included in *Pseudombrophila* by van Brummelen (1995). It may be necessary to introduce a new combination in that genus for *Svrcekomyces pallidus*, pending further investigation of British *Pseudombrophila*.

In his monograph of *Pseudombrophila*, van Brummelen (1995) recognised two sections within the genus, *P.* sect. *Pseudombrophila* and *P.* sect. *Nannfeldtiella*, for which neither author nor basionym were directly indicated. Under each section name, only the phrase 'For synonymy see under generic name' was used. It is not clear what was intended by this phrase, although a list of generic synonyms of *Pseudombrophila* with publication reference and type species was provided. As van Brummelen (1995) complied with the rules of ICBN for other new taxa and new combinations made in the monograph, it seems that the appropriate requirements for the new section combination were accidentally omitted. In order to make the section name available for use, it is validated here:

*Pseudombrophila* Boud. sect. *Nannfeldtiella* (Eckblad) Brumm. ex Y.J. Yao & Spooner, **comb. nov.**

$\equiv$  *Nannfeldtiella* Eckblad in *Nytt Mag. Bot.* 15: 116 (1968).

= *Pseudombrophila* Boud. sect. *Nannfeldtiella* (Eckblad) Brumm. in *Libri Botanici* 14: 65 (1995). *nom. invalid*, ICBN Art. 33.3.

Mycobank number: MB500917.

Type species: *Nannfeldtiella aggregata* Eckblad 1968 (= *Pseudombrophila guldeniae* Svrček 1966).

***Sowerbyella radiculata*** (Sowerby: Fr.) Nannf. in *Svensk Bot. Tidskr.* 32: 119 (1938). (Figs. 1A, B and D)

≡ *Peziza radiculata* Sowerby, *Eng. Fung. Pl.* 114 (1797): Fr., *Syst. Mycol.* 2: 81 (1822).

≡ *Lachnea radiculata* (Sowerby: Fr.) W. Phillips, *Man. Br. Discomyc.*: 202 (1887).

≡ *Geopyxis radiculata* (Sowerby: Fr.) Masee, *Br. Fung. Fl.* 4: 379 (1895).

≡ *Pseudotis radiculata* (Sowerby: Fr.) Boud., *Hist. Classific. Discomyc. Europe*: 52 (1907).

= *Peziza bauerana* Cooke, *Mycographia* 1: 129 (1876).

≡ *Sowerbyella bauerana* (Cooke) Harmaja in *Karstenia* 24: 29 (1984).

= *Peziza radiculata* var. *percevalii* W. Phillips in Cooke, *Mycographia* 1: 178 (1877).

≡ *Lachnea radiculata* var. *percevalii* (W. Phillips) W. Phillips, *Man. Br. Discomyc.*: 203 (1887).

≡ *Geopyxis cookei* var. *percevalii* (W. Phillips) Masee, *Br. Fung. Fl.* 4: 379 (1895).

= *Sowerbyella crassisculpturata* J. Moravec in *Mycotaxon* 23: 492 (1985).

= *Discina parvispora* Trigaux in *Doc. Mycol.* 16(61): 13 (1985).

≡ *Sowerbyella parvispora* (Trigaux) J. Moravec in *Mycologia Helvetica* 2: 95 (1986).

[Although the pagination of the whole publication was cited in the reference to the basionym, this combination is acceptable because only one species was discussed in the original paper, the whole pagination therefore being coextensive with that of the protologue (see ICBN Art. 33.3 Note 1)]

Sowerby's type material (ex Herb. Berkeley, K(M) 30427) for this name has been well preserved at K. Examination of this material shows mature ascospores  $14\text{--}16.5 \times 7.5\text{--}9 \mu\text{m}$ , with irregular, branched anatomising ridges often forming an incomplete, rarely complete reticulum. Many other specimens display similar spore characters, e.g. the paratype of *S. crassisculpturata* mentioned above, the type of material of *Peziza radiculata* var. *percevalii* (West Sussex, Stopham, Oct. 1876, H.S. Perceval, ex Herb. Cooke, K(M) 30425 (isotype) and ex Herb. Phillips, K(M) 30426 (holotype); ascospores  $14\text{--}16 \times 7.5\text{--}8.5 \mu\text{m}$ , Fig. 1B), an early collection (Buckinghamshire, Dropmore, 30 Oct. 1867, ex Herb. Broome, K(M) 121062; ascospores  $14.5\text{--}16.5 \times 8\text{--}9 \mu\text{m}$ ) and a recent collection (Berkshire, Silchester, near Reading, Jan. 2004, A. Merrick, K(M) 121060; ascospores  $13.5\text{--}15 \times 7.5\text{--}8 \mu\text{m}$ ). The type of *Discina parvispora* Trigaux 1985 (from France, see below) also has similar spores and the name is here determined as a synonym of *S. radiculata*. Examination of the type material of *Peziza bauerana* Cooke (from Germany, detail see also below) also confirmed the synonymy of this name with *S. radiculata*. However, several collections with characters differing consistently (mainly in spore size and form) from those given above have been observed amongst British collections of *Sowerbyella* and are here recognised at varietal level. One of these varieties is described here as new. Few collections of these taxa have yet

been identified, but more extensive examination of the British collections under *S. radiculata* in K may reveal further material. These varieties are considered below.

***Sowerbyella radiculata*** (Sowerby: Fr.) Nannf. var. ***kewensis*** Y.J. Yao & Spooner, **var. nov.** (Fig. 1C)

Mycobank number: MB500918.

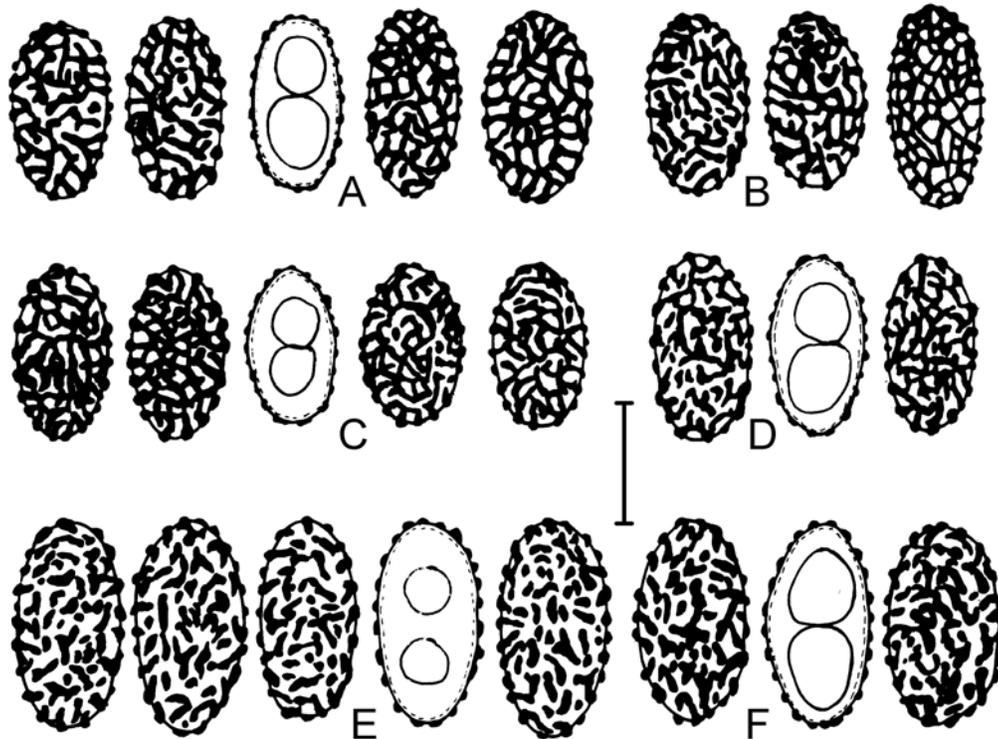
*Etym.*: named after Kew, referring to the location from which the variety was first recognised.

*Apothecia* dispersa vel gregaria vel caespitosa, 20-55 mm diam. *Discus* concavus vel planus, flavus vel ochraceus. *Receptaculum* cupulatum, stipem, pallidum, pubentem, marginatum incurvum. *Ectal excipulum* e textura angularis. *Medullary excipulum* e textura intricata. *Asci* operculati, jodo non caerulescenti, cylindrici, 180-210 × 9-10 μm, 8 spori. *Ascospores* unicellulares, hyalinae, ellipsoideae, 12-13 (-14) × 6.5-8 μm, verrucis vel cristis vel reticulis ornatae. *Paraphyses* filiformes, septatae.

*Apothecia* scattered to gregarious or caespitose, 20-55 mm diam. *Disc* concave to flat, yellow to ochraceous. *Receptacle* cupulate, often with a long stipe, paler than disc, surface downy and binding debris, margin incurved. *Ectal excipulum* a textura angularis, 80-100 μm thick, composed of a layer of irregular, angular, thin-walled, colourless cells, 10-32 × 8-26 μm, overlain by a layer of woven, thin-walled, septate, colourless or pale yellowish-brown hyphae. *Medullary excipulum* a textura intricata, up to 800 μm thick, hyphae 5.0-10.0 (-12.0) μm diam., thin-walled, septate, colourless, loosely to densely woven. *Asci* operculate, I-, narrowly cylindrical or cylindrical, tapering to the base, 180-210 × 9-10 μm, uniseriately 8-spored. *Ascospores* unicellular, colourless, ellipsoid, 12-13 (-14) × 6.5-8 μm, ornamented with irregular warts and ridges, often anastomosing and forming a complete or incomplete reticulum. *Paraphyses* filiform, septate, straight or curved but not hooked, occasionally forked near the apex, slightly enlarged to 3-5.5 μm diam.

*Specimens examined*: England: Surrey, Royal Botanic Gardens, Kew, 4 Jan. 1985, E.W. Brown, K(M) 78446; in mulched flowerbed, 5 Nov. 1985, E.W. Brown, K(M) 30429, **Holotype**; 3 Jan. 1986, R.W.G. Dennis, K(M) 78450; 9 Oct. 1986, J. Pitt; K(M) 78452; on soil (mulched), under *Camellia* sp., 27 Nov. 2003, E.W. Brown, K(M) 120948. Hampshire, Northington, The Grange, among *Urtica*, 18 Oct. 1998, G. Mattock, K(M) 59438. Kent, Swanscombe, Darenth Wood, in litter, under *Corylus* and *Carpinus*, 12 Oct. 1993, S. Lines, K(M) 24480. Norfolk, in clusters on soil under *Castanea*, 12 Dec. 1993, comm. M. Jordan, K(M) 25162. Sussex, East Grinstead, Dec. 1945, F.L. B-B., K(M) 120950.

The smaller, ellipsoid ascospores of this variety, compared with cylindrical-ellipsoid ascospores measuring (13.5-) 14-15.5 (-16.5) × 7.5-9 μm in the typical variety of *S. radiculata*, were initially noticed from collections made at the Royal Botanic Gardens, Kew. A number of other collections from various parts of England were found to exhibit the same spore characters. Although hitherto found mainly in South-east England, *S. radiculata* var.



**Fig. 1.** Line drawings of ascospores in *Sowerbyella radiculata*. **A.** *Sowerbyella radiculata* var. *radiculata*, K(M) 30427, holotype. **B.** *Sowerbyella radiculata* var. *radiculata*, K(M) 30425, isotype of *Peziza radiculata* var. *percevalii*. **C.** *Sowerbyella radiculata* var. *kewensis*, K(M) 30429, holotype. **D.** *Sowerbyella radiculata* var. *radiculata*, K(M) 94359, isotype of *Discina parvispora*. **E.** *Sowerbyella radiculata* var. *petaloidea*, K(M) 30430, type. **F.** *Sowerbyella radiculata* var. *petaloidea*, K(M) 121073a, lectotype of *Geopyxis cookei*. Bar = 10  $\mu\text{m}$ .

*kewensis* has also been found in Hampshire and Norfolk and may prove to be more widespread as additional collections are examined. Some collections of this variety may have been previously referred to typical *S. radiculata*.

During initial attempts to identify this taxon, those species of the genus with potentially small ascospores were investigated, viz. *S. bauerana* (Cooke) Harmaja, *S. brevispora* Harmaja and *S. parvispora*. *Peziza bauerana* was considered as a synonym of *S. radiculata* by Nannfeldt (1938) and supported by Moravec (1985a,b), but recombined in *Sowerbyella* as an independent species by Harmaja (1984), who also provided a spore measurement of  $11\text{--}13 \times 6.5\text{--}7.2 \mu\text{m}$ . The spore size of *P. bauerana* was given as  $14 \times 7.5 \mu\text{m}$  by Cooke (1876). Examination of the type material of *P. bauerana* (Germany, Darmstadt, in sylvis, leg. Bauer, Rabenhorst Fungi Europaei 615, ex Herb. Cooke, K(M) 121165) shows ascospores to be scanty and mostly immature, measuring  $13.0\text{--}15 \times 7.5\text{--}8.5 \mu\text{m}$  (another measurement by R.W.G. Dennis annotated in pencil

on the herbarium sheet shows  $14-16 \times 8 \mu\text{m}$ ). It is, therefore, concluded that *P. bauerana* Cooke is correctly interpreted as another synonym of *S. radiculata* and that Harmaja's (1984) material may represent another taxon. *Sowerbyella brevispora* has ascospores  $9-12 \times 5-6.5 \mu\text{m}$  (Harmaja 1984), much smaller than those found in British collections. The spore size of *S. parvispora* was given as  $(15-16) (-19.5) \times (7.5-8) (-9.5) \mu\text{m}$  in the protologue, but as  $11.5-13.5 (-14) \times 6.7-7.5 (-8.3) \mu\text{m}$ , reaching  $15.5 \times 8.5 \mu\text{m}$  in 1-2 spored asci, in Moravec (1986) and as  $10.5-13.5 (-14) \times 6.2-7.5 (-8.3) \mu\text{m}$  in Moravec (1988b). Examination of an isotype of *Discina parvispora* (France, Champagne, Montigny, Vesle, on cultivated soil, with *Quercus*, *Corylus*, *Populus* etc., Feb 1984, G. Trigaux, K(M) 94359), kindly donated for study and for deposition at K by Mme Trigaux, reveals ascospores  $13.5-15 \times 7.5-8.5 \mu\text{m}$  (Fig. 1D) with ornamentation indistinguishable from that in other specimens of typical *S. radiculata*. Therefore, *S. parvispora* is here recognised as a synonym of the latter. It may be noted that Moravec's (1986) interpretation of the species is different from the protologue, especially with regard to stalk of apothecia and to spore size.

***Sowerbyella radiculata*** (Sowerby: Fr.) Nannf. var. ***petaloidea*** (Cooke & W. Phillips) Y.J. Yao & Spooner, **comb. nov.** (Figs. 1E and F)

≡ *Peziza petaloidea* Cooke & W. Phillips in Phillips, *Man. Br. Discomyc.*: 46 (1887).

≡ *Geopyxis petaloidea* (Cooke & W. Phillips) Sacc., *Syll. Fung.* 8: 67 (1889).

≡ *Aleuria petaloidea* (Cooke & W. Phillips) Boud., *Hist. Classific. Discomyc. Europe*: 47 (1907).

= *Geopyxis cookei* Masee, *Br. Fung. Fl.* 4: 378 (1895).

= *Peziza radiculata* β *alutacea* Broome, *in sched.*

Mycobank number: MB500919.

*Apothecia* scattered to gregarious, 10-25 mm diam. *Disc* concave to flat, yellow to ochraceous. *Receptacle* cupulate, stipitate, pale than disc, margin incurved. *Ectal excipulum* a *textura angularis*, 120-140  $\mu\text{m}$  thick, composed of a layer of irregular, angular, thin-walled, colourless cells,  $12-23 \times 10-18 \mu\text{m}$ , overlain by a layer of woven, thin-walled, septate, colourless or pale yellowish-brown hyphae, 6.0-12  $\mu\text{m}$  diam. *Medullary excipulum* a tightly woven *textura intricata*, 500-800  $\mu\text{m}$  thick, comprising thin-walled, septate, colourless hyphae, 5-10 (-16)  $\mu\text{m}$  diam. *Asci* operculate, I-, narrowly cylindrical or cylindrical, tapering to the base,  $200-250 \times (9-) 10-14 \mu\text{m}$ , uniseriately 8-spored. *Ascospores* unicellular, colourless, ellipsoid,  $(15-) 16-18 \times 7.5-9 \mu\text{m}$ , ornamented with irregular, mostly isolated warts and short ridges, rarely anastomosing. *Paraphyses* filiform, septate, often curved above but not hooked, apex 2.5-3.5  $\mu\text{m}$  diam.

***Specimens examined:*** England: Suffolk, East Bergholt, 2 Feb. 1852, K(M) 30430, TYPE; Buckinghamshire, Dropmore, 24 Nov. 1876, ex Herb. Broome, K(M) 121063.

Germany: Staurenberg prope Giessen, H. Hofmann, Rabenhorst Fungi Europaei, No. 618, ex Herb Cooke, K(M) 121073a (**Lectotype designated here** for *Geopyxis cookei* Masee) and K(M) 121073b.

This was considered a species of *Aleuria* Fuckel by Boudier (1907) and remained in that genus until studied by Spooner and Yao (1995), who determined it to be a member of *Sowerbyella*. Ascospores from the type material are closely ornamented with verruculae and short ridges which only rarely anastomose. It apparently has close affinity with typical *S. radiculata*. However, the ascospores are consistently larger than those of the typical variety. There appear to be no other distinguishing characters and, therefore, the combination of this taxon in *Sowerbyella* is treated at varietal rather than species level.

*Geopyxis cookei* has been a forgotten name in British literature since it was listed by Ramsbottom and Balfour-Browne (1951) as a tentative synonym of *S. radiculata*. It was described (Masee, 1895) based on material used by Cooke (1874, 1876) for illustration of *S. radiculata*. Collections from Great Britain, France and Germany were mentioned by Cooke (1876). However, the exsiccatum 'Rabh. F.E. 618' was the only collection from which the drawing of an ascus, containing 8 warted spores, was prepared by Cooke (1874), cited again for his Fig. 99 in Cooke (1876). Two parts of Rabh. F.E. 618 are now housed in K and one of them marked as 'Herb. Cooke'. The French and German material used by Cooke (1874, 1876) cannot now be located and the British material (as 'communicated by C.E. Broome' in Cooke (1876)) also cannot be positively determined amongst collections at K. Examination of Rabh. F.E. 618, which should be regarded as one of the syntypes of this name, shows similar spore size ( $15-18 \times 7.5-9.5 \mu\text{m}$ ) and ornamentation (isolated warts and short ridges) to that of the type of *S. radiculata* var. *petaloidea*, confirming the larger, verruculose spores as mentioned by Masee (1895) (although his comment on the ochraceous hymenium is no longer confirmable). It is, therefore, concluded that *G. cookei* is synonymous with *S. radiculata* var. *petaloidea* and, as the name was based on more than one specimen, the collection Rabh. F.E. 618, ex Herb Cooke, K(M) 121073a, is here designated as the lectotype of *G. cookei* Masee 1895 (Fig. 1F).

It is interesting to note that the collection from Buckinghamshire, Dropmore (K(M) 121063, cited above) was originally determined by C.E. Broome as different from another collection from the same locality (K(M) 121062, Buckinghamshire, Dropmore, 30 Oct. 1867, ex Herb. Broome; identified here by the present authors as *S. radiculata* var. *radiculata*), and to this former specimen he applied an unpublished name *Peziza radiculata*  $\beta$  *alutacea*.

**Table 1.** Current status of taxa referred to *Sowerbyella*.

Name	Place of publication	Notes on current status
<i>S. angustispora</i> J.Z. Cao & J. Moravec	<i>Mycol. Helv.</i> 3(1): 136 (1988).	√
<i>S. bauerana</i> (Cooke) Harmaja	<i>Karstenia</i> 24 (1): 29 (1984)	Syn. of <i>S. radiculata</i> (this paper)
<i>S. brevispora</i> Harmaja	<i>Karstenia</i> 24 (1): 29 (1984)	√
<i>S. crassisculpturata</i> J. Moravec	<i>Mycotaxon</i> 23: 492 (1985)	Syn. of <i>S. radiculata</i> (this paper)
<i>S. densireticulata</i> J. Moravec	<i>Mycotaxon</i> 23: 494 (1985)	√
<i>S. fagicola</i> J. Moravec	<i>Ceska Mykol.</i> 27 (2): 66 (1973)	√
<i>S. imperialis</i> (Peck) Korf	<i>Phytologia</i> 21 (4): 206 (1971)	√
<i>S. kaushalii</i> J. Moravec	<i>Mycol. Helv.</i> 2 (1): 94 (1986)	Syn. of <i>Otideopsis kaushalii</i> (Moravec 1988a)
<i>S. pallida</i> (Spooner) J. Moravec	<i>Mycol. Helv.</i> 1 (6): 431 (1985)	? <i>Pseudombrophila pallida</i> (this paper)
<i>S. parvispora</i> (Trigaux) J. Moravec	<i>Mycol. Helv.</i> 2 (1): 95 (1986)	Syn. of <i>S. radiculata</i> (this paper)
<i>S. phlyctispora</i> (Lepr. & Mont.) Hohmeyer & J. Moravec	<i>Czech Mycol.</i> 47 (4): 263 (1994)	√
<i>S. polaripustulata</i> J. Moravec	<i>Mycotaxon</i> 23: 493 (1985)	√
<i>S. radiculata</i> (Sowerby) Nannf.	<i>Svensk bot. Tidskr.</i> 32: 119 (1938)	√
<i>S. radiculata</i> var. <i>kewensis</i> Y.J. Yao & Spooner	<i>Fung. Diversity</i> 21: XX (2006)	√
<i>S. radiculata</i> var. <i>petaloidea</i> (Cooke & W. Phillips) Y.J. Yao & Spooner	<i>Fung. Diversity</i> 21: XX (2006)	√
<i>S. reguisii</i> (Quél.) J. Moravec	<i>Mycol. Helv.</i> 1 (6): 429 (1985)	√
<i>S. reguisii</i> var. <i>venustula</i> (Rifai) Häffner	<i>Rheinland-Pfälzisches Pilzjournal</i> 3 (1): 50 (1993)	√
<i>S. rhenana</i> (Fuckel) J. Moravec	<i>Mycol. Helv.</i> 2 (1): 96 (1986)	√
<i>S. unicolor</i> (Peck) J. Moravec	<i>Czech Mycol.</i> 47 (4): 266 (1994)	√
<i>S. unicolor</i> (Gillet) Nannf.	<i>Svensk bot. Tidskr.</i> 32: 118 (1938)	Syn. of <i>S. imperialis</i> (Korf, 1971)

√ Recognisable from the literature.

Although further study of the several dozen British collections preserved under the name of *S. radiculata* at K may reveal additional collections of *S. radiculata* var. *petaloidea*, it is notable that only early collections from the latter part of 19th Century have been identified, and that there appear to be no recent or modern collections of this taxon, at least from Britain. It may be further noted that *S. densireticulata* J. Moravec, described from Slovakia, has similar spore size and ornamentation (Moravec, 1985a) to this taxon, and comparison of the type material of *S. densireticulata* with British collections of *S. radiculata* var. *petaloidea* is required to determine if they represent the same taxon.

***Current status of known taxa of Sowerbyella***

With the two varieties proposed in this paper, a total of 20 taxa have been referred to the genus *Sowerbyella*. As shown above, the taxonomic position of several of these taxa requires clarification. For the convenience of reference, the current status of the known taxa in *Sowerbyella* is summarised in Table 1.

There are currently 14 taxa, including 11 species and three varieties, which can be recognised in *Sowerbyella*, based largely on a survey of the literature (Table 1). A key to these taxa, again based largely on published data, is provided below. It is intended for guidance only because we have not examined many of the taxa included and further taxonomic revision is required to confirm the correct placement of some of them.

**Key to species of *Sowerbyella***

(measurements of ascospores excluding ornamentation)

1. Spore ornament of large, irregular warts to 5  $\mu\text{m}$  wide  $\times$  4  $\mu\text{m}$  high (spores 15-18  $\times$  8.5-10  $\mu\text{m}$ ) ..... *phlyctispora*
1. Spore ornament punctate, or of irregular small warts or ridges, or a partial to complete reticulum..... 2
2. Spore ornament of isolated small warts and lines, rarely anastomosing..... 3
2. Spore ornament a partial or complete reticulum..... 8
3. Spores narrowly ellipsoid, Q = 2.3-2.6, under 16  $\mu\text{m}$  long ..... *angustispora*
3. Spores ellipsoid, Q usually <2.2 (if narrower, spore length 17-20  $\mu\text{m}$ ) ..... 4
4. Spore length 12  $\mu\text{m}$  or less; apothecia fulvous to brown ..... *brevispora*
4. Spore length 13  $\mu\text{m}$  or more; apothecia yellow to orange ..... 5
5. Spores large, mostly 16-20  $\mu\text{m}$  long..... 6
5. Spores smaller, mostly <15  $\mu\text{m}$  long ..... 7
6. Spores mostly 17-20  $\mu\text{m}$  long, densely punctate-verruculose, with mostly isolated small warts to 0.7  $\mu\text{m}$  across; apothecia with *Fagus* ..... *fagicola*
6. Spores mostly 16-18  $\mu\text{m}$  long, ornamented with warts and short ridges which may rarely anastomose ..... *radiculata* var. *petaloidea*
7. Spores with fine, isolated warts; apothecia with conifers..... *imperialis*
7. Spores spinose-echinulate; apothecia with deciduous trees..... *polaripustulata*
8. Disc bright yellow; spore ornament a dense, irregular incomplete reticulum with narrow, elongated meshes mostly 0.5-1.5  $\mu\text{m}$  wide; spores often over 16  $\mu\text{m}$  long.. *densireticulata*
8. Disc orange to orange yellow or olive; spore ornament a complete or incomplete reticulum with meshes 1.5-4  $\mu\text{m}$  wide..... 9

9. Spores large, 17-22  $\mu\text{m}$  long..... 10  
 9. Spores smaller, <16.5  $\mu\text{m}$  long..... 12
10. Spore ornament a regular reticulum; disc orange-yellow ..... *rhenana*  
 10. Spore ornament an irregular and mostly incomplete reticulum; disc orange or olive-yellow .....11
11. Disc yellow-olive; European .....*reguisii* var. *reguisii*  
 11. Disc orange; Australian .....*reguisii* var. *venustula*
12. Disc pale yellow, with pink tints; spore ornament of irregular, anastomosing lines and partial reticulum; apothecia taller than broad, sometimes split on one side and *Otidea*-like ..... *unicisa*  
 12. Disc yellow, lacking pink tints; spore ornament of dense warts or short ridges, often forming a reticulum; apothecia broader than tall, not split on one side..... 13
13. Ascospores cylindric-ellipsoid, mostly 14.0-15.5  $\times$  7.5-9.0  $\mu\text{m}$ ..*radiculata* var. *radiculata*  
 13. Ascospores ellipsoid, mostly 12.0-13.0  $\times$  6.5-8.0  $\mu\text{m}$  .....*radiculata* var. *kewensis*

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