

## *Sphinctrina tigillaris*, an overlooked species of *Chaenothecopsis* growing on *Perenniporia meridionalis*, a polypore new to the UK\*

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**Abstract:** The original material of *Sphinctrina tigillaris*, collected in 1864, was relocated, re-examined, found to represent a species of *Chaenothecopsis*, and is transferred to that genus as *C. tigillaris* comb. nov. It occurred on a specimen of a polypore, now identified as *Perenniporia meridionalis*, on a beam in a Northamptonshire church, and does not appear to have been collected since. *Perenniporia meridionalis* is a predominantly central and southern European species which has not previously been recognized in the British Isles, although other English specimens have now been located in collections at Kew and referred to the related *P. medulla-panis*. The name *Sphinctrina tigillaris* had been overlooked since its original description in 1865, and is nomenclaturally distinct from *Lichen tigillaris*, the basionym of *Cyphelium tigillare*. Notes on five other calicioid fungi found on polypores, and a key to the six now known, are also included.

**Key words:** *Calicium*, *Cyphelium*, fungicolous fungi, lichens, *Mycocaliciaceae*, *Phaeocalicium*

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### Introduction

The name *Sphinctrina tigillaris* was introduced by Berkeley & Broome (1865*a*) for a short-stiped minute British calicioid fungus with 1-septate spores “.00015–.0003 long”. The species was given the English name “Rafter *Sphinctrina*” by Cooke (1871), having originally been described from a wooden beam in a church, but appears to have been subsequently overlooked by lichenologists and other mycologists. It is not mentioned in any of the standard catalogues of British lichens or other fungi, nor was it considered in the

monograph of the European species of *Sphinctrina* (Löfgren & Tibell 1979). This situation may well be due to confusion with the nomenclaturally unrelated and familiar calicioid lichen now known as *Cyphelium tigillare* (Ach.) Ach. 1815, based on the name *Lichen tigillaris* Ach. 1799 (Tibell 1971). Berkeley & Broome’s original material in the fungarium of the Royal Botanic Gardens Kew (K) has now been re-examined, and this contribution addresses the correct application of this long-forgotten name.

### Methods

Historical collections of *Sphinctrina tigillaris* in K were sectioned using a Reichert-Austria OME sliding microtome and mounted in lactic acid and lactofuchsin as semi-permanent slides. These and squash mounts in water were examined on a Leica DM LB2 compound microscope. Micrographs were obtained with camera attachment DFC320 on this microscope and on a Leica MZ16 stereomicroscope using Leica Application Suite (LAS) software, version V3.8. High resolution images of the three vouchers found on the type sheet are available through JSTOR Plant Science via the following web links: <http://plants.jstor.org/specimen/km000179042?s=t> for lectotype, <http://plants.jstor.org/>

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\*Dedicated to the Polish mycologist and conservationist Maria Ławrynowicz in recognition of her 70th birthday in 2013.

specimen/k-m000153753?s=t for isolectotype, and <http://plants.jstor.org/specimen/k-m000153754?s=t> for syntype.

### Taxonomy

#### **Chaenothecopsis tigillaris (Berk. & Broome) D. Hawksw. comb. nov.**

Mycobank No.: MB808957

Basionym: *Sphinctrina tigillaris* Berk. & Broome, *Ann. Mag. Nat. Hist.*, ser. 3 15: 450 (1865).

Synonym: *Calicium tigillare* (Berk. & Broome) Sacc., *Syll. Fung.* 8: 836 (1889); nom. illegit. (Art. 53.1) [non *Calicium tigillare* (Ach.) Pers. 1811].

Type: Great Britain, England, Northamptonshire, King's Cliffe church, on *Perenniporia meridionalis* on a wooden beam, 1864, M. J. Berkeley [?] [K(M) 179042—lectotype designated here (ex-hb. Berkeley), MycoBank No. MBT178073; K(M) 153753—isolectotype (ex-hb. Broome)].

(Fig. 1)

*Ascomata* scattered over the hymenophore surface of the host basidiomata, arising singly, calicioid, black, somewhat glossy, mainly 150–200 µm tall. *Stipe* 35–50 µm thick below the capitulum, composed of compacted brownish hyphae forming a dense intertwined irregularly periclinally orientated *textura intricata*, becoming paler towards the base, hyphae smooth-walled, somewhat torulose, uneven in thickness, 2.0–2.5 µm wide, ±homogeneous in structure; KOH–. *Capitulum* expanding abruptly from the stipe, hemispherical, surface convex, ±smooth, not forming a mazaedium, 195–210 µm diam. *Hypothecium* dark brown, formed by a continuation of the stipe hyphae expanding radially and periclinally, *textura intricata*, c. 50 µm in height. *Exciple* dark brown, 4.0–7.5 µm thick, 2–3 cells thick, composed of short-torulose hyphae to somewhat irregularly angular isodiametrical cells, individually mainly 3.5–4.5 µm diam. *Hymenium* hyaline, but appearing brownish from the ascospores, 65–75(–80) µm tall. *Epithecium* continuous, persistent, brown, 4.5–6.5 µm thick, formed of adhering almost pseudoparenchymatous cells, individually 3.0–4.5 µm diam., with somewhat unevenly thickened walls, formed

from terminal branches of interascal filaments. *Asci* persistent, narrowly cylindrical, unitunicate in structure, 45–52 × 2.5–3.5 µm, 8-spored. *Ascospores* uniseriately arranged in the ascus, narrowly ellipsoid, pale brown, 1-transseptate, the septum slightly darker brown, appearing smooth, but with some spiral verruculose ornamentation evident at the highest magnifications (> × 1000), 4.5–6.0(–7.0) × (1.5–)2.0–2.5(–3.0) µm.

*Typification.* The original diagnosis refers to two collections, “on an old *Polyporus* from a beam in King’s Cliffe Church, and on wood at Batheaston, C.E. Broome.” There are two specimens under the name *Sphinctrina tigillaris* from King’s Cliffe on a polypore in K, one from hb. Berkeley and one from hb. Broome; the latter appears to be a piece physically cut from the first. The larger of the two is selected as lectotype here; it is the isolectotype, however, that has measurement annotations in Berkeley’s hand. In addition, two packets from King’s Cliffe were found in the basidiomycete section of the fungarium filed under *Perenniporia medulla-panis* [K(M) 75884]; one from hb. Berkeley and one from hb. Cooke. These two specimens were originally determined by Berkeley as *Polyporus subfuscoflavidus* (as “*subfuscoflavidus*”), redetermined as *P. medulla-panis* by J. Lowe in 1960, and now redetermined as *P. meridionalis*. It is likely that this material, at least in part, was documented by Berkeley & Broome (1865*b*) as being found “on oak planks in the roof of King’s Cliffe Church”. One set of specimens from hb. Berkeley was also found to support the *Chaenothecopsis*; that specimen is undated (see below) but could be either a second isolectotype or a later collection from the same church. Given the close association between these calicioid and pored species, both of which were documented as British in 1865, it seems curious that a complete name for the polypore is not amongst the annotations accompanying the original *C. tigillaris* collections.

There is a single specimen from Broome’s herbarium on wood on the same sheet as the

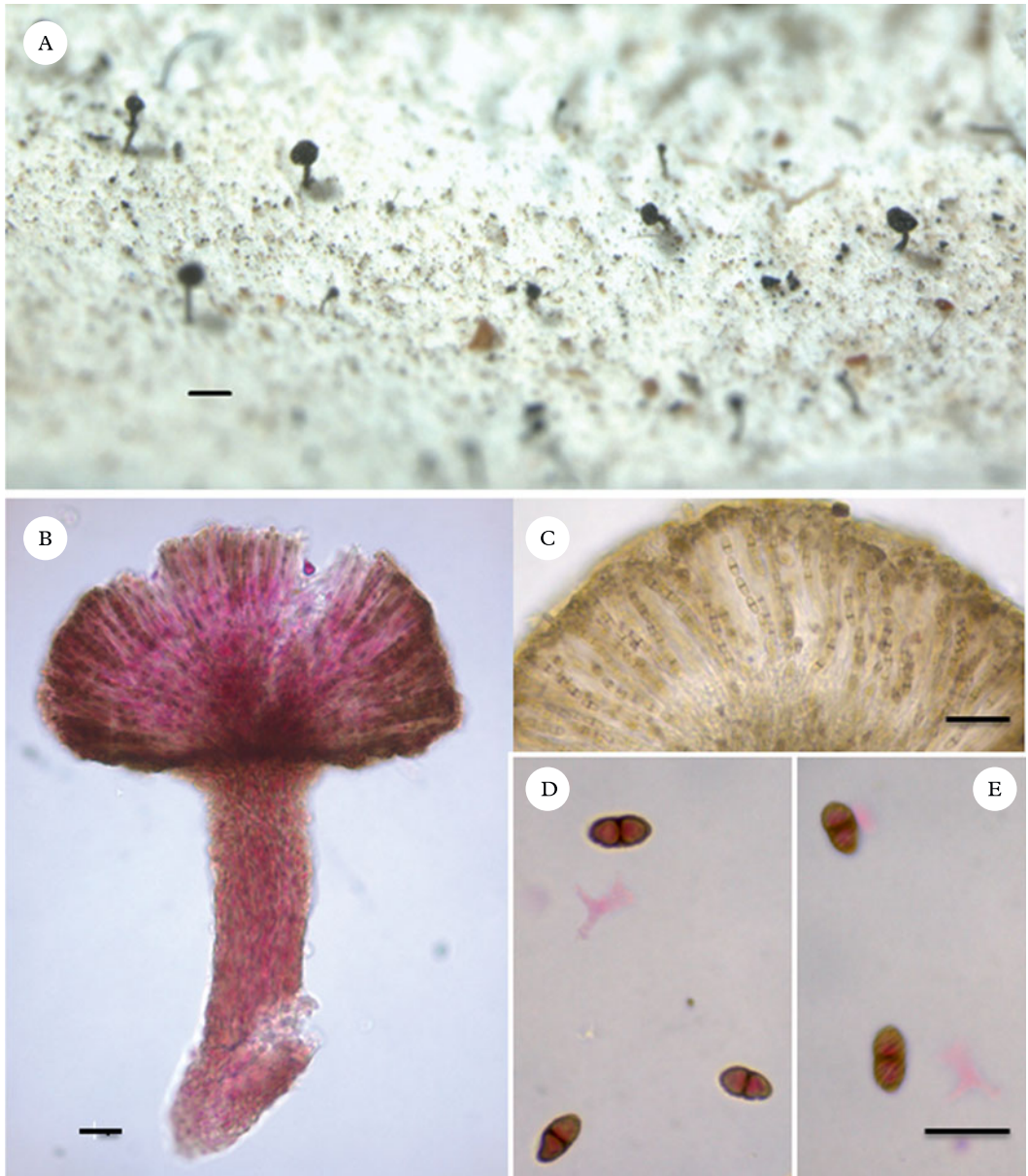


FIG. 1. *Chaenothecopsis tigillaris*. A, habit showing stalked ascomata on *Perenniporia meridionalis*; B, microtome section of ascoma mounted in lactofucsin; C, hymenial tissues in lactic acid, showing the ascospores uniseriately arranged in asci; D & E, uniseptate ascospores, showing spiral ornamentation. A & C [isoelectotype, K(M) 153753]; B, D & E [lectotype, K(M) 179042]. Scales: A = 200  $\mu$ m; B & C = 20  $\mu$ m; D & E = 10  $\mu$ m.

isoelectotype, but with no locality, date, or indication of the collector and which is annotated “= *Calicium tympanellum*” [i.e. the species now known as *Cyphelium inquinans* (Keissler 1938)]. While it is possible this is the specimen from Batheaston, that cannot be established without doubt, and it is not congeneric with the collection from the polypore (see below). As Berkeley retained only

the fungus on the polypore in his collection, and that collection was made the year prior to the publication of the name, this is the most appropriate material for designation as the lectotype.

*Additional material. Great Britain: England: V. C. 32, Northamptonshire: King’s Cliffe church, on Perenniporia meridionalis [as Polyporus subfuscus-flavidus], s.d., ex hb. Berkeley (K(M) 75884, sub P. meridionalis).*

### Key to the calicioid fungi known on polypores

Of the six species keyed out here, only *Chaenotheca brunneola*, *Chaenothecopsis caespitosa*, and *C. tigillaris* are known from the British Isles.

- |      |  |                                   |
|------|--|-----------------------------------|
| 1    | Ascomata not producing a mazaedium, ascospores 1-septate, ellipsoid; not lichenized . . . . .  | 2                                 |
|      | Ascomata producing a distinct mazaedium, ascospores non-septate, spherical or cuboid; lichenized. . . . .  | 5                                 |
| 2(1) | Ascomata arising singly. . . . .   | 3                                 |
|      | Ascomata arising in dense caespitose tufts, stalks branched and anastomosed, ascospores smooth, 9–14 × 3.0–4.5 µm . . . . .  | <b>Chaenothecopsis caespitosa</b> |
| 3(2) | Ascospores < 10 µm in length . . . . .   | 4                                 |
|      | Ascospores (10–)12–15(–20) × 3–4 µm. . . . .   | <b>Phaeocalicium polyporaenum</b> |
| 4(3) | Ascospores 4.5–6.0(–7.0) × (1.5–)2.0–2.5(–3.0) µm . . . . .  | <b>Chaenothecopsis tigillaris</b> |
|      | Ascospores 3–5 × 2.5–3.0 µm . . . . .  | <b>Chaenothecopsis polyporae</b>  |
| 5(1) | Ascospores spherical, walls smooth or with irregular fissures, (2.0–)3.5–4.5(–5.5) µm diam; stalk black, not pruinose; algal partner <i>Dictyochloropsis</i> . . . . . | <b>Chaenotheca brunneola</b>      |
|      | Ascospores spherical to cuboid, walls irregularly thickened, 3–4 µm diam.; stalk and capitulum with a yellow-green pruina; algal partner <i>Stichococcus</i> . . . . . | <b>Chaenotheca brachypoda</b>     |

### Discussion

Titov (2006) treated an impressive 58 species in *Chaenothecopsis*, many of which were illustrated in colour and with scanning electron micrographs (SEM) of the ascospores; none agreed with *C. tigillaris*. The absence of a lichenized thallus and the rather small ascospores are suggestive of *Mycocalicium* (Tibell 1999), but the spiral ornamentation on the ascospores precludes a placement in that genus. The asci of the type material of *Sphinctrina tigillaris* were not in a sufficiently

good state to determine the details of the ascus tip structure to confirm the placement in *Chaenothecopsis*; in that genus, the ascus tips should be elongated with a long and narrow central channel, while no such channel is evident in the ascus tips of *Mycocalicium* and *Phaeocalicium* species (Schmidt 1970; Tibell 1975; Hawksworth 1980).

We presume that *C. tigillaris* is a saprobe rather than a pathogen of *Perenniporia meridionalis* as infected parts of the host basidome continue to generate basidiospores.



The third specimen under the name *Sphinctrina tigillaris* in Kew, which came from the Broome herbarium [K(M) 153754], could be a syntype but lacks information as to the locality and date. This specimen occurred directly on wood, with no indication of any polypore being present and a thin immersed lichenized thallus is evident in microtome sections. The ascomata are mazaedial, arise from a short stipe up to *c.* 200  $\mu\text{m}$  tall, and expand to a capitulum of *c.* 250  $\mu\text{m}$  diam.; some capitula have a faint reddish brown pruina on the lower parts. The ascospores are brown, 1-septate, broadly ellipsoid, verruculose with a spiral ornamentation (at over  $\times 1000$ ), and mainly  $7\text{--}9 \times 3.0\text{--}4.5 \mu\text{m}$ . This specimen is a species of *Calicium*, and not *Cyphelium inquinans* as the later annotation on the label (see above) suggests. It actually belongs to the widespread *Calicium salicinum* Pers. 1794, a species most commonly found on wood, which is described in detail by Tibell (1999).

*Chaenothecopsis tigillaris* is not the only calicioid fungus to be reported from poroid basidiomata, as indicated in the key above:

(1) *Chanenotheca brachypoda*, a lichen-forming species in which the ascomata produce a mazaedium, is primarily associated with rotting wood and bark, but is also reported from “old polypores” in Scandinavia (Tibell 1999). Rikkinen (1995) mentions it from dead basidiomes of polypores “on rotten birch”, and he informs us that the fungus typically extends from open cankers onto the hymenial surfaces of *Fomes fomentarius* and *Piptoporus betulinus* (J. Rikkinen, pers. comm.). The report of “*C. stemonea* f. *albocinerea*” on unnamed species in central Finland by Koskinen (1955) could also belong here, but the application of that name is uncertain (Tibell 1980).

(2) *Chaenotheca brunneola*, also a lichen-forming species in which the ascomata produce a mazaedium, was mentioned by Tibell as sometimes growing on “*Polyporus* sp.” (Tibell 1980), and occasionally on *Trametes versicolor* (Tibell 1981). It is described and illustrated in detail by Tibell (1980), who records the non-septate ascospores as spherical and “(2.2)3.4–[4.0]–4.6(5.4)  $\mu\text{m}$ ”.

(3) *Chaenothecopsis caespitosa*, described from a decaying indeterminate polypore and subsequently found on rotten wood of *Taxus*, has complex compacted branched ascomata 2–4 mm tall, and also larger ascospores, measuring  $9\text{--}14 \times 3.0\text{--}4.5 \mu\text{m}$  (Hawksworth 1980; Titov 2006).

(4) “*Chaenothecopsis polyporae*” is a designation given to a calicioid fungus found on an unidentified tree-inhabiting polypore in Canada. It was mentioned as “*Chaenothecopsis* sp.” and stated to have ascospores  $3\text{--}5 \times 2.5\text{--}3.5 \mu\text{m}$  by Goward (1999). Goward had, however, used “*Chaenothecopsis polyporae*” on a packet of this fungus which he sent to Titov for study (T. Goward, *in litt.*). Titov (2006) provided a brief description of “*Chaenothecopsis polyporae* Goward (ined.)”, but he did not validate the designation. On the basis of the slightly smaller size given for the ascospores, Goward’s fungus could be close to, or even be identical with, *Chaenothecopsis tigillaris*. However, we have not studied any of his material and no other measurements apart from the ascospore size range were available; it is also not known if that fungus had similar spore ornamentation.

(5) *Phaeocalicium polyporaeum* occurs on the upper surface of *Trichaptum bifforme* basidiomata. It has been considered to grow on *Trametes* (syn. *Coriolus*) species (Keissler 1938; Hawksworth 1980; Tibell 1981), a genus in a different order, and *Trichaptum bifforme* was added as an additional host by Tibell (1981), who also distributed material growing on it (Tibell 1989). However, the hosts of all six collections in K (including Lojka’s type from Hungary) were re-examined and all found to represent *T. bifforme*. This fungus is larger, with delicate stipes to almost 1 mm in height, and 0–1-septate often indistinctly septate ascospores measuring  $(10\text{--})11\text{--}15\text{--}(20) \times (2.5\text{--})3.0\text{--}4.0\text{--}(5.0) \mu\text{m}$  (Hawksworth 1980; Tibell 1981; Titov 2006). Peck (1876) reported *C. tigillaris* (as *Sphinctrina*) on *Polyporus abietinus* (now assigned to *Trichaptum*) from Albany and Buffalo in New York State and noted that “the spores in our specimens are .0003–.0006 long”. Based on spore and host data alone, we suggest these specimens are more likely

to represent either *P. polyporaenum* or an undescribed taxon.

The host polypore of *Chaenothecopsis tigillaris* was determined as *Perenniporia meridionalis* Decock & Stalpers 2006 and is of particular interest. That fungus favours dead *Quercus* wood in warmer forests of central and southern Europe although, interestingly, it is also recorded on construction timber in more northerly locations (Decock & Stalpers 2006). This polypore had not previously been reported from the UK, but has only recently been formally distinguished from *P. medulla-panis* (Jacq.) Donk 1967 by the larger pores and basidiospores, and the differing reaction of the wider vegetative hyphae to Melzer's reagent (Decock & Stalpers 2006). That polypore also occurs on dead *Quercus* wood, but has a much more northerly distribution in Europe. On a re-examination of the UK collections filed as *P. medulla-panis* in K (all from England), the five that belonged to *Perenniporia* were redetermined as *P. meridionalis*. This resulted in a shift in the English status of the former species from "Extinct" (Evans *et al.* 2006) to "Not English" (Ainsworth 2014). Furthermore, no authentic British or Irish vouchers have been traced, and so *P. medulla-panis* is scheduled for exclusion from the British and Irish Basidiomycota checklist (<http://www.basidiochecklist.info/>).

We have not located any collections of *Chaenothecopsis tigillaris* made since the original in 1864, but the fungus clearly should be searched for on any *Perenniporia* specimens encountered, particularly those on building timbers or other worked wood. The five English specimens redetermined as *Perenniporia meridionalis* (see above) were, with one exception recorded on oak timber in 1935, collected in the 19th century. Although mostly lacking ecological data, these basidiomata and associated wood, where present, had characters consistent with similarly anthropogenic habitats. As this fungus is evidently thermophilous elsewhere in Europe (Decock & Stalpers 2006), it is possible that both it and its calicioid associate are not

British natives and were inadvertently introduced, perhaps repeatedly, with imported timber. In the absence of any compelling evidence that *P. meridionalis* has ever established a viable British population in the outdoor environment, it qualifies for inclusion as an alien in the checklist (<http://www.basidiochecklist.info/>) and would therefore remain as "Not Evaluated" (NE) in an IUCN-compliant regional conservation assessment (IUCN 2014).

We are indebted to Amanda Waterfield for first drawing this material to our attention while curating material in the Royal Botanic Gardens Kew. Trevor Goward kindly provided background information on the material studied by the late Alexander N. Titov, Jouko Rikkinen generously shared his unpublished observations on *Chaenotheca brachypoda*, and Leif Tibell indicated that he had not encountered this fungus before. This contribution was prepared while DLH was in receipt of funding from the Spanish Ministerio de Ciencia e Innovación project CGL2011-25003.

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