

THE REHABILITATION OF *SCLEROTINIA BRESADOLAE*

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Described from oak apple galls and fallen buds of *Quercus robur* in the Netherlands and recently synonymized with *Ciborinia candolleana*, *Sclerotinia bresadolae* is reinstated as an independent species after studying Rick's type material in Oudemans's herbarium and fresh collections on oak apples from England and Germany. According to Boudier's figures and published descriptions, and the study of two English collections, *Ciborinia hirtella* seems to be a synonym.

Collections of villose apothecia on oak galls and the investigation of type material of *Sclerotinia bresadolae* Rick prompted a comparison with *Ciborinia hirtella* (Boud.) Batra & Korf, reported from chestnut, oak, and other debris.

Type collection of *Sclerotinia bresadolae*

Oudemans's herbarium contains a collection annotated '*Sclerotinia Bresadolae* Rick. In gallis putrescentibus a *Dryotera* [apparent misspelling of *Dryopteris*] *terminalis* provocatis infoliis. Valkenburg (Limburg) 1899. J. Rick' and, in the old German script, '*Scl. Bresadolae* Vorsicht'.

On examining the sparse contents, whilst the apothecia macroscopically appeared smooth, several collapsed, very pale brown to hyaline, tapering, septate hairs, up to 176 μm long, were located on the flank and the stipe. The ectal excipulum is of *textura globulosa* followed by a layer of *textura intricata* with the stipe of *textura porrecta*. Asci ($n = 20$) 63–71–82 \times 4.3–6.1–7.9 μm , 8-spored, staining faintly blue with iodine, bluntly cylindrical, often with a short neck. Ascospores ($n = 50$) 7.0–8.4–9.5 \times 2.8–3.6–4.1 μm , uniseriate, hyaline, varying from ellipsoid to slightly flattened on one side, usually rounded at one end and pointed at the other. Paraphyses were filiform, simple, occasionally septate, hyaline and slightly swollen at the tips to 2 μm diameter. The sclerotia are disciform, c. 1.6 mm and 1.8 \times 1.4 \times 0.4 mm, with a black rind of one to two cells of melanized *textura globulosa* to *angularis*, becoming *textura intricata* in the white medulla, with a layer of embedded host tissue showing in section.

In the literature

Rick (1900) described *Sclerotinia bresadolae* as '... hyalino-fusca vel pallida, stipite tenuissimo, filiformi, 1–5 cm longo, villosa, versus discum fere lanuginosa; 1–5 mm lata, ceracea, mollia' on sclerotia in decaying galled buds of the 'Stieleiche' (= *Quercus robur* L.) infected by the gall wasp '*Dryoteras* [*Dryopteris*] *terminalis*, a synonym of *Biorhiza pallida* (Olivier), as well as loose sclerotia in the soil and on fallen oak buds in the garden of the Ignatius College in Valkenburg, province Limburg, Netherlands, in the spring of 1899. He

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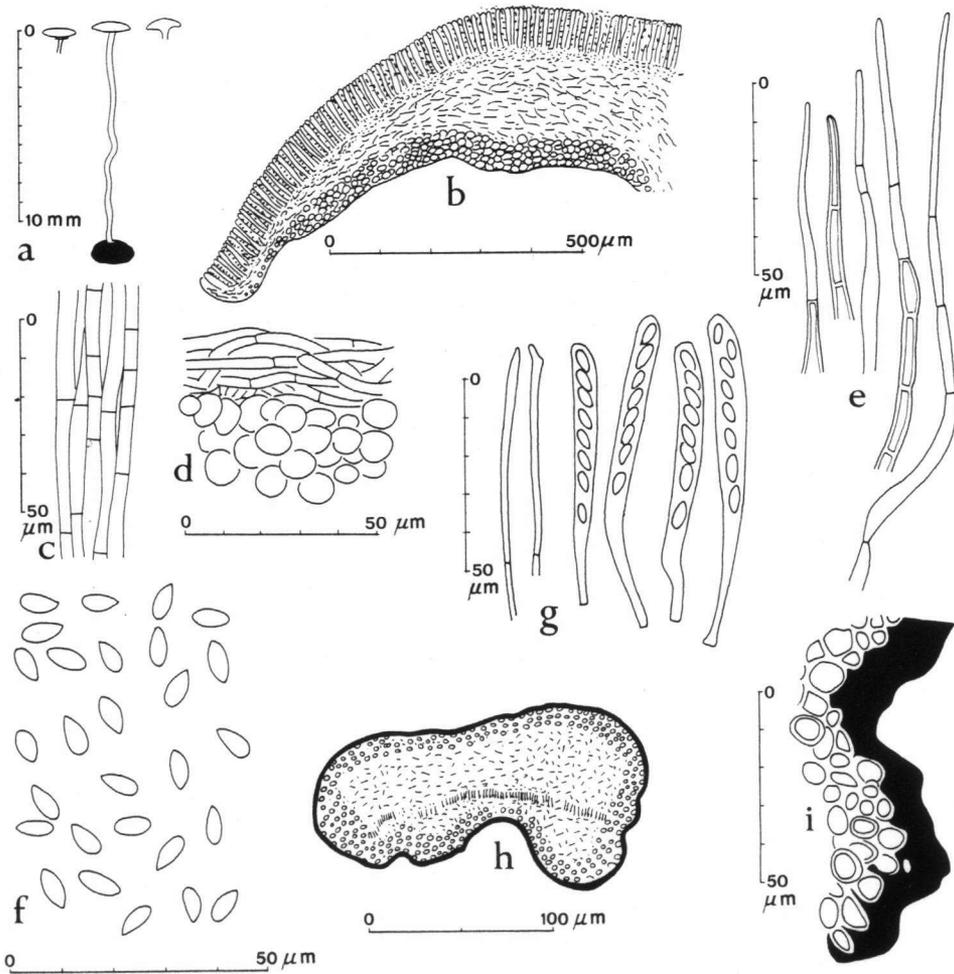


Fig. 1. *Sclerotinia bresadolae* lectotypus in L. — a. Apothecia and sclerotium. — b. Section of apothecium. — c. Stipe interior. — d. Excipulum. — e. Hairs from stipe. — f. Ascospores. — g. Asci and paraphysis. — h. Section of sclerotium. — i. Rind and medulla of preceding.

stated that, whilst microscopically identical with '*Sclerotinia Candolleana* (Lév.)', it differed by 'den haardünner, viel längeren Stiel und dessen Behaarung' but gave no illustration.

Rehm (1915) published a similar but slightly shortened version of the original description, citing only the original collection with the comment 'Der äußerst dünne, behaarte Stiel scheidet von *Scl. Candolleana*, doch wird der Pilz sicherlich zu dieser Art gehören.'

Kohn (1979) listed the species as 'imperfectly known' on the basis that the original diagnosis was insufficient to determine the species. Later, however, Kohn (1981) examined

authentic material in Bresadola's herbarium in S, reporting the ectal excipulum to be formed of large-celled textura globulosa with 'loaf-shaped' sclerotia incorporating host xylem vessels distinguished by their spirally thickened walls, the medullary cells dorsiventrally differentiated, the upper zone formed of textura globulosa with gelatinous walls and the lower zone composed of textura oblita, but did not find any hairs as described in Rick (1900), only '... tufts of fine hyphae, originating either from germinating spores or from infection of apothecia by another fungus, seen in some apothecia examined.' She therefore compared her findings with the description of *Ciborinia candolleana* (Lév.) Whetzel in Batra (1960) and considered Rick's specimen to be a rare occurrence of *C. candolleana* on insect galls, which, in the present instance, are modified oak leaves.

Palmer (1990), who made two collections in England of apothecia on sclerotia embedded in old, fallen oak apples beneath *Quercus robur*, studied Rick's original material of *S. bresadolae* in Oudemans's herbarium, formerly in herbarium GRO but now in L, which agreed closely with the English material and the diagnosis in Rick (1900), including the external septate hairs. He also overwintered oak apples showing sclerotia from the first and further localities in England and Germany, which produced apothecia in the following year and were in agreement with the type of *S. bresadolae* and the English collections studied, except one which produced only two apothecia, on which none of the characteristic hairs could be found.

Composite description (based on the preceding)—Figs. 1–12

Apothecia prominently pilose, stipitate, mainly developing singly, but occasionally up to three, on sclerotia embedded in host tissue. Sclerotium up to 2 mm diam. long, disciform to elongated and rounded with a black rind comprising one to two layers of melanized textura globulosa to angularis with a white medulla of textura intricata, within which traces of host tissues often apparent. Apothecium with disc up to 3 mm diam., initially concave, becoming plain but occasionally waved and sometimes convex when old, creamy white to greyish orange (5A3, 5A4, and 5B5 in Kornerup & Wanscher, 1967). Stipe up to 12 × 0.4 mm, slender, flexuous, concolorous and varying in length according to depth of immersion in gall tissue or litter. Hairs variably but sometimes densely covering the flank and the stipe, where often debris-entangled, to 175 µm long (up to 120 µm in British and German collections), developing from a bulbous cell, faintly coloured to hyaline, septate, tapering, occasionally curved. Ectal excipulum formed of pale brown to hyaline textura globulosa with cells occasionally to 15 µm diam. Medullary excipulum of textura intricata merging with the hypothecium. Asci 60–85–96 × 4.1–7.4–8.2 µm, 8-spored, staining blue with iodine in the tip, cylindrical, often with a short neck and a blunt apex. Ascospores 4.9–7.5–8.8(–10.4) × 2.6–4.1–4.8 µm, mainly uniseriate, hyaline, eguttulate, broadly to narrowly ellipsoid, sometimes slightly flattened on one side, mainly rounded at one end and slightly pointed at the other. Paraphyses simple to branched, filiform, occasionally septate with tip enlarged to 3 µm.

Affinity with *Ciborinia hirtella*—Table I

Sclerotinia bresadolae closely resembles *Ciborinia hirtella* (Boud.) Batra & Korf (1959), described by Boudier (1907) as occurring in April on leaves and decaying branchlets of *Castanea sativa*, Forêt de Montmorency, France, with external hairs up to 110 µm long, which he distinguished from *Ciborinia candolleana* by its pilose exterior and elongated sclerotia.

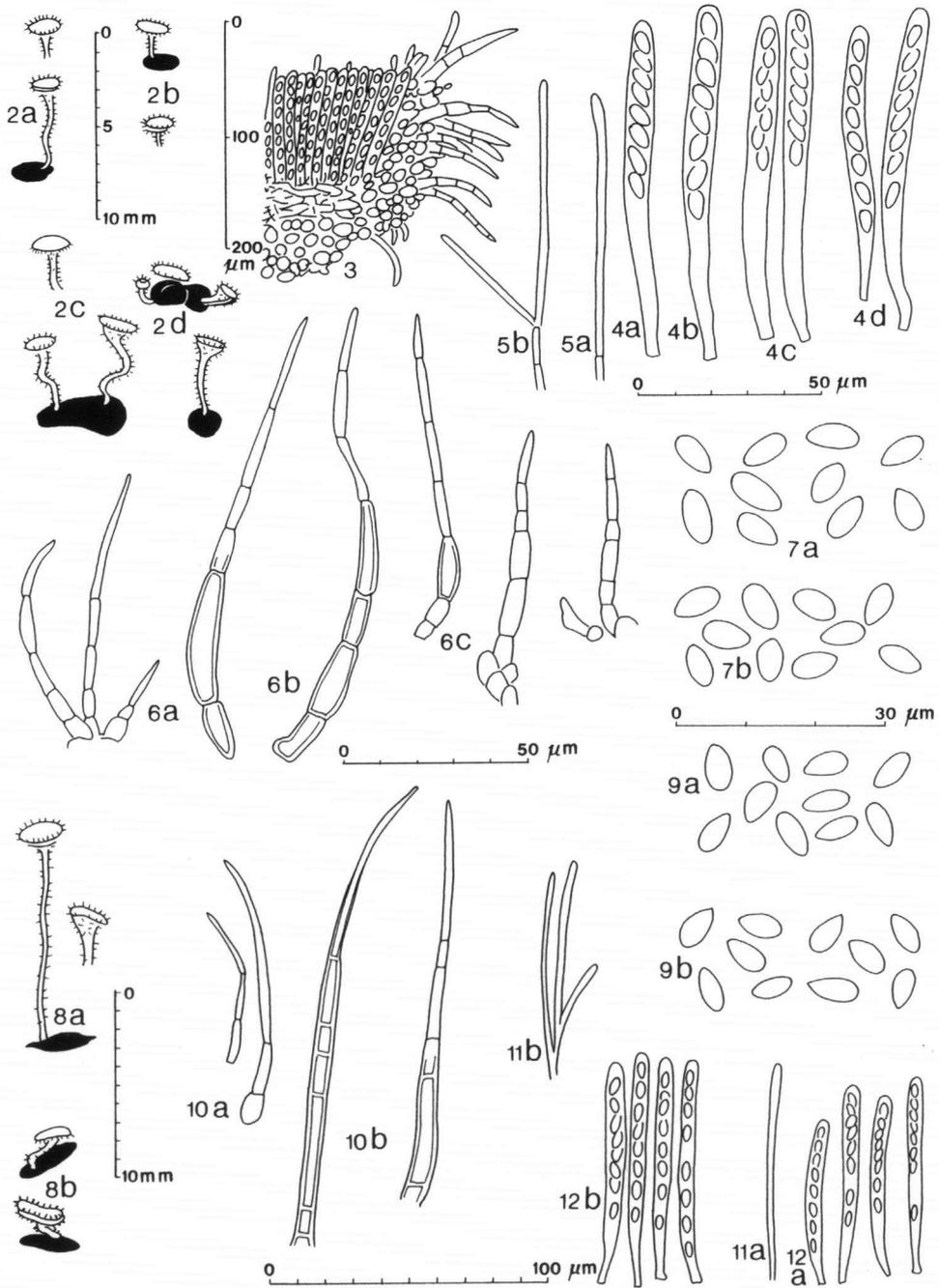


Table. I. Comparison of *Sclerotinia bresadolae* with *Ciborinia hirtella*.

Name/Origin	Locality	Hairs (μm)	Asci (μm)	Ascospores (μm)
<i>S. bresadolae</i>				
Rick (1900) & Rehm (1915)			70–80 × 6–7	6–8 × 3–4
Typus in L		–176	59–82 × 4–8	7.4–9.5 × 2.8–4.0
J.T.P. 3147	Gathurst (Eng.)	50–110	76–94 × 5.7–8.1	5.7–10.4 × 3.2–5.1
J.T.P. 3149 ¹	Gathurst (Eng.)		78–95 × 5.5–7.8	4.9–8.4 × 3.8–4.7
J.T.P. 3806 ¹	Glossop (Eng.)	65–95	65–96 × 4.1–7.5	6.4–8.3 × 3.1–4.8
J.T.P. 3824 ¹	Lorch (Germ.)	80–115	60–82 × 3.7–6.2	5.7–8.5 × 2.6–4.4
J.T.P. 3825 ¹	Gathurst (Eng.)	65–120	76–94 × 4.5–8.2	6.3–9.2 × 2.6–4.8
<i>C. hirtella</i>				
Boudier (1907) & (1911)		90–110	90–115 × 7–8	7–9 × 4–5
Rehm (1915)		100		
Dennis (1956)		90–100	90–115 × 7–8	7–9 × 4–5
J.T.P. 4546 ²	Monkspath (Eng.)	55–100	62–74 × 5.0–7.0	6.0–8.0 × 2.8–4.0
J.T.P. 4547 ³	Ilkley (Eng.)	110–135	74–86 × 5.0–8.0	5.6–8.0 × 2.4–4.1

J.T.P. = collection in the herbarium of the author. Voucher specimens have been deposited in the Rijks-herbarium, Leiden (L).

¹ Palmer (1990) with additional measurements.

² M.C. Clark 70/3, 8.V.1972, on *Quercus debris*, Monkspath, Warwickshire, England.

³ M.C. Clark 70/4, 15.V.1972, on *Quercus* petiole, Stobham Wood, Ilkley, Yorkshire, England.

Excellent figures were published by Boudier (1904–1911, 272 pl. 471; issued in June 1909) with the description being slightly different, and additionally reporting it on leaves in the Forêt de l'Isle-Adam. The fungus seems to have been infrequently collected. Published records are as '*Sclerotinia Candolleana* ? var. *hirtellum* Boud.' in Rehm (1915) on *Castanea sativa* leaves in Rheingau, Bavaria, with a short description and as *Sclerotinia hirtella* in Le Gal (1938) without description, as very rare on various woody debris of beech and pine in May to June in Bois de la Grange et de l'Étoile, Seine-et-Oise, France. Grelet (1948) gave a description, citing the previous French localities whilst Dennis (1956) stated typically on *Castanea* twigs with collections seen on bud scales of ? *Castanea*, Leith Hill, Surrey, 29.V.1945

Figs. 2–7. Collections identified as *S. bresadolae* in Herb. J.T.P. — 2. Apothecia on sclerotia: a. 3147; b. 3806; c. 3824; d. 3825. — 3. Marginal section from 3147. — 4. Asci: a. 3147; b. 3149; c. 3806; d. 3824. — 5. Paraphyses: a. 3824; b. 3825. — 6. Hairs: a. 3147; b. 3824; c. 3825. — 7. Ascospores: a. 3147; b. 3806.

Figs. 8–12. Collections identified as *Ciborinia hirtella* by M.C. Clark in Herb. J.T.P. — 8. Apothecia on sclerotia: a. 4546; b. 4547. — 9. Ascospores: a. 4546; b. 4547. — 10. Hairs: a. 4546; b. 4547. — 11. Paraphyses: a. 4546; b. 4547. — 12. Asci: a. 4546; b. 4547.

and petioles of *Castanea*, Aldbury Common, Hertfordshire, England, 12.V.1955. Batra & Korf (1959), who recombined the epithet with *Ciborinia*, gave no description but Batra (1960) quoted the dimensions of Dennis (1956) for asci and spores in his key. Moser (1963) included *C. hirtella* in his key, stating 'An abgefallenen Blättern und Knospenschuppen (auch Zweigen) von Edelkastanien. (Stellung etwas unsicher).' Dennis (1960), and in subsequent editions as British Ascomycetes, referred to the species, without dimensions, as *Sclerotinia hirtella*, occurring on fallen leaves, twigs, and bud scales of *Castanea* in south-east England. Listed as *Ciborinia hirtella*, Clark (1980) reported the fungus from March to June on decayed *Quercus* catkins buried in leaf litter from eight localities, including Monkspath, in Warwickshire, England. Bramley (1985) reported *C. hirtella*, but without substratum, in May, 1977, from Middleton Wood, Ilkley, Yorkshire, England.

DISCUSSION

From the preceding, it is clear that *Sclerotinia bresadolae* is a distinct species, mainly characterized by the flexuous, septate hairs on the exterior and, although type material of *Sclerotinia hirtella* has not been studied, from the published description and illustrations of Boudier, as well as English collections so-determined, this species, currently placed in *Ciborinia* Whetzel, appears to be a synonym.

Described from and recollected by the writer on oak apple galls, and further reported by Rick on fallen *Quercus robur* buds, the range of substrates now includes fallen catkins and petioles of *Quercus*, leaves and twigs of *Castanea sativa*, as well as woody debris of *Fagus sylvatica* and *Pinus*.

Though it is possible that the opinion of Kohn (1981), after examining the Rick material in Bresadola's herbarium in S, that *S. bresadolae* represented a rare occurrence of *Ciborinia candolleana* on oak galls may have been due to a mixed collection, the characteristic hairs appear to collapse readily or to denude and it is therefore also possible that she may have misinterpreted them as being hyphae from another fungus. It is noteworthy that, whilst the other characters were in general agreement, although the asci were somewhat longer, the writer also failed to find any hairs on the two apothecia on oak apples overwintered from Alderley Edge, Cheshire, which were, however, in poor condition at time of examination.

The presence of plant tissue within the sclerotia, as well as the apparent absence of an anamorph, indicates that *Sclerotinia bresadolae* belongs in *Ciborinia* Whetzel and the transfer to this genus therefore follows with the collection in Oudemans's herbarium in L being indicated as the lectotype.

Ciborinia bresadolae (Rick) J.T. Palmer, *comb. nov.*

Sclerotinia bresadolae Rick in Öst. bot. Z. 50: 121. 1900 (basionym).

Sclerotinia hirtella Boud., Hist. Class. Discom. Eur.: 107. 1907.

Sclerotinia candolleana var. 'hirtellum' (Boud.) Rehm in Ber. Bayer. bot. Ges. 15: 241. 1915.

Ciborinia hirtella (Boud.) Batra & Korf in Am. J. Bot. 46: 448. 1959.

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REFERENCES

- BATRA, L.R. (1960). The species of *Ciborinia* pathogenic to *Salix*, *Magnolia* and *Quercus*. *In* *Am. J. Bot.* 47: 819–827.
- BATRA, L.R. & KORF, R.P. (1959). The species of *Ciborinia* pathogenic to herbaceous angiosperms. *In* *Am. J. Bot.* 46: 441–450.
- BOUDIER, J.L.É. (1904–1911). *Icones Mycologicae, ou iconographie des champignons de France*. 1–372, pls. 1–600. '1905–1910'. Paris.
- (1907). *Histoire et classification des Discomycètes d'Europe*. i–vii, 1–223. Paris.
- BRAMLEY, W.G. (1985). *A fungus flora of Yorkshire*. i–xii, 1–277. Leeds.
- CLARK, M.C. (1980). *A fungus flora of Warwickshire*. 1–272. London.
- DENNIS, R.W.G. (1956). A revision of the British Helotiaceae in the Herbarium of the Royal Botanic Gardens, Kew, with notes on related European species. *In* *Mycol. Pap.* 62: 1–216.
- (1960). *British cup fungi and their allies*. i–xxiv, 1–280. London.
- GRELET, L.-J. (1948). Les Discomycètes de France d'après la classification de Boudier. *In* *Rev. Mycol.* 13: 105–134.
- KOHN, L.M. (1979). A monographic revision of the genus *Sclerotinia*. *In* *Mycotaxon* 9: 365–444.
- (1981). *Sclerotinia bresadolae* Rick, a taxonomic synonym of *Ciborinia candolleana* (Lév.) Whetzel. *In* *Mycotaxon* 13: 405–406.
- KORNERUP, A. & WANSCHER, J.H. (1967). *Methuen handbook of colour*. Ed. 2. 1–243. London.
- LE GAL, M. (1938). Florule mycologique des Bois de la Grange et de l'Étoile (Seines-et-Oise). Discomycètes. *In* *Rev. Mycol.* 3: 129–147.
- MOSER, M. (1963). Ascomyceten (Schlauchpilze). *In* *Kleine KryptogFl.* (ed. H. Gams) IIa: 1–147.
- PALMER, J.T. (1990). Sclerotinaceous cup fungi on oak galls. *In* *Cecidology* 5: 31–44.
- REHM, E. (1915). Zur Kenntnis der Discomyceten Deutschlands, Deutsch-Oesterreichs und der Schweiz. *In* *Ber. bayer. bot. Ges.* 15: 234–254.
- RICK, J. (1900). Eine neue *Sclerotinia*-Art. *In* *Öst. bot. Z.* 50: 121–122.