

**XYLARIA DIGITATA AND ITS ALLIES – DELIMITATION AND
TYPIFICATION—I**

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A lectotype for *Xylaria digitata* ss. Nitschke & al. is chosen and a new species, *X. friesii* based on *X. digitata* sensu Lundell & Nannfeldt is described. *Xylaria scotica* is placed into the synonymy of *X. guepini* and *X. torulosa* is considered a dubious taxon not related to *X. digitata*. The relationship between *X. acuta* and *X. digitata* is discussed and likewise between *X. bubosa*, *X. friesii*, and *X. guepini*.

Xylaria digitata (L.: Fr.) Grev. has often been mentioned in the literature but I know of no one who has actually seen fresh material of this species. It has even been suggested that it could be a 'ghost species' based on immature or 'starved' specimens of other *Xylaria* species (Krieglsteiner, 1990), but from descriptions given e.g. by Dennis (1956, 1968) it is evident that a genuine taxon can be recognized. In North America the name has mainly been misapplied to *X. cornu-damae* (Schw.) Fr. (Rogers, 1984), and Rogers was unable to report any North American material matching *X. digitata* ss. auct. Lundell & Nannfeldt (1947) issued another, smaller-spored taxon from Sweden under the name *X. digitata* in their Fungi Exsiccatae Suecici. Nannfeldt justified the name by referring to a Fries collection with similar small spores from southern Sweden. This led me to undertake a study of material under this name in European herbaria in order to stabilise the nomenclature for the taxa in question. The recent 'monograph' on European *Xylaria* species by Bertault (1984) proved unhelpful and his concepts for the sectional and specific levels are inadequate for understanding the genus.

Persoon (in Gmelin, 1791) was the first to give a 'relatively detailed' diagnosis of *X. digitata* following the original very short version by Linnaeus (1753). Nitschke (1867) gave the first detailed account of the microscopical characters of *Xylaria* species, including *X. digitata*. Petch (1939), in a study of British species of *Xylaria*, commented on the disappearance of *X. digitata*. He also studied type material of *X. scotica* Cooke and *X. tortuosa* Sow. ex Cooke and cited both as synonyms of *X. digitata*. Dennis (1984) reported the American species, *X. acuta* Peck, from Italy, based on material in Erbar. critt. ital. under the highly controversial name *X. cupressiformis* (Woodward) Beccari. This material was also restudied to establish the synonymy for the *X. digitata* complex.

It is a privileged honour to dedicate this paper to Dr. R.A. Maas Geesteranus on the 80th anniversary of his birth.

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MATERIAL

About 220 collections (labelled *X. digitata*, *X. bulbosa*, *X. acuta*, *X. cupressiformis* or *X. guepini*) from the following herbaria were studied: B, C, E, IMI, K, L, PAD, PC, RO, S, UPS. A small number of American specimens from BPI, FH, NY, and NYS were also included. It should be noted that material filed under *X. polymorpha* (Pers.: Fr.) Grev. was not considered. No doubt additional collections of *X. digitata* and other interesting species could be found if material under this name is revised.

RESULTS

The material labelled as *X. digitata* represented approximately 20 taxa; 25% are teleomorphic collections of true *X. digitata*, while 19% are anamorphic states of *X. digitata*. The remaining group represents *X. hypoxylon* (L.: Fr.) Grev. at about 12%, followed by *X. polymorpha* (Pers.: Fr.) Grev. and *X. cornu-damae*. At the bottom of the list are nine taxa with a single collection each, including the only collection not belonging to *Xylaria* (? *Laetiporus*). Surprisingly, *X. longipes* was a member of this group.

Xylaria digitata (L.: Fr.) Grev.—Figs. 1–6, 14

Clavaria digitata L., Species plantarum 2: 1182. 1753. — *Sphaeria digitata* (L.) J.F. Gmelin, Linnaeus Systema naturae (ed. 13) 2, 2: 1474. 1791. — *Hypoxylon digitatum* (L.: Fr.) Mérat, Nouv. Fl. Env. Paris (ed. 2) 1: 138. 1821. — *Xylophaera digitata* (L.) Dumort., Comment. bot.: 92. 1822. — *Xylaria digitata* (L.: Fr.) Grev., Fl. Edin.: 355. 1824. — Type specimen: ad trabes lignaque, cariosa, saepe in hortis, (fasciculate stroma glued on paper) herb. Persoon (Neotype here chosen, L 910270-625).

Selected illustrations.—Persoon, Obs. mycol. 2: pl.2, figs. 1, 6. 1799. — Hoffmann, Veg. crypt. 1, tab. 4, fig. 2. 1787. — Dennis (1956: 413, fig. 15); Traverso (1913: 19, fig. 1.7)

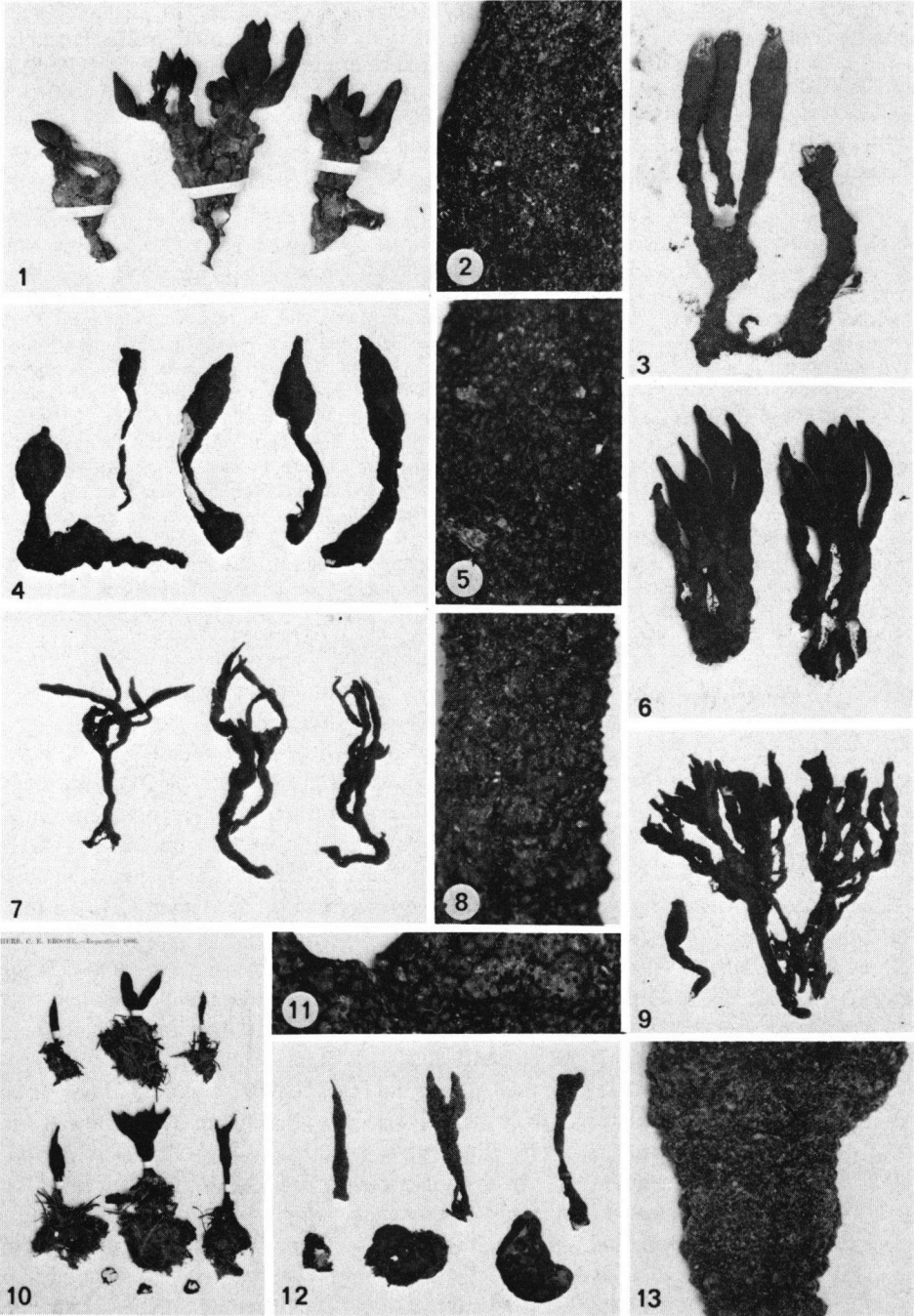
Excluded illustrations.—Holmskjöld, Beata ruris otia fungis danicis 1. 1799 (*X. polymorpha* on *Fagus* stump). — Flora danica pl. 900 (*X. polymorpha*). — Bolton, Hist. fung. Halifax 3, pl. 129. 1789 (*X. hypoxylon*). — Sowerby, English fungi 1, pl. 69. 1797 (*X. polymorpha*).

Selected descriptions.—Nitschke (1867: 9); Dennis (1956: 412).

Stromata mostly fasciculate, simple or branched up to three times, typically arising from half-buried wood, often from man made constructions, poles, etc., total length 40–90 mm; bases pannose with purplish brown to vivid purple felty covering, up to 40 mm broad; fertile parts narrowly clavate to cylindrical with more or less apiculate, sterile apices, 12–40 × 3–7 mm; surface roughened from ectostromal squamules, perithecial outlines and papillate ostioles; entostroma white to off-white, massive and firm; perithecia sphaerical or deformed by mutual pressure, 0.3–0.5 mm diam.

Asci 8-spored, fertile part cylindrical with obliquely uniseriate spores, 140–160(–205) µm, stipe 105–120(–140) µm; spores obliquely uniseriate; apical apparatus 2.6–3.6(–4.2) ×

Figs. 1–13. *Xylaria* species. — 1–6. *X. digitata*. — 1. Bern, ex Herb. Shuttleworth (K). — 2, 3. Neotype, ex herb. Persoon (L). — 4, 5. Italy, Selva Pisana, as *X. cupressiformis* (RO). — 6. Budapest, Frigyes, ex herb. Rehm (S). — 7–9. *X. friesii*. — 7, 8. Sweden, Karlvall 2387 (S). — 9. Isotype, Lundell & Nannfeldt 1458 (K). — 10–13. *X. bulbosa*. — 10–11. England, Luchnam, 10 Oct., ex herb. Broome (K). — 12–13. Holotype, ex herb. Persoon (L). — (Figs. 2, 5, 8, 11, 13 × 6; Fig. 1 × 0.5; Fig. 3 × 0.9; Fig. 4 × 0.8; Fig. 6 × 0.5; Fig. 7, 9 × 0.4; Fig. 10 × 0.4; Fig. 12 × 0.9).



(2-)2.3–3.4 μm , staining deep blue in Melzer's reagent, more or less barrel shaped with flaring apical rim; spores inequilaterally fusiform, with ventral side more or less concave, medium to dark sooty brown with olive and/or red intermixed, (15.8-)16.5–20(-21.8) \times (4.6-)5.2–6.3(-6.9) μm (average range 17–19.5(-20.5) \times 5.2–6); germ slit often difficult to observe, 1/4–1/3 of total length, straight to slightly oblique, ventral.

Distribution.—Europe, including United Kingdom, France, The Netherlands, Germany, Switzerland, Italy, and Hungary.

Specimens examined (selected from teleomorphic coll.).—THE NETHERLANDS: 'Aan een schoeijing' (wood stack at riverbank), Dordrecht, VIII.1841, *van der Sande Lacoste* 464 (ex herb. Kon. Ned. Bot. Ver.; L). — GERMANY: Dresdae, ad ligna fabrefacta humi jacentia, loco suo per totum annum, *L. Rabenhorst* 252, F. europ. 46 (K (2), L, PAD, S (teleomorph), RO (2, imm.); a part in L (910247-825, Rabenhorst first ed.?) is another smaller spored species); Leipzig, ex herb. von Thümen (K); Münster, in Füstings Garten, IV.1866, Füsting (B); An faulenden Brettern eines Gartenbeetes im Paradies bei Constanz, Herbst 1857, und aus einem Regenwasserbehälter auf der Reichenau, X.1858, *Leiner*, 432. Jack, Leiner u. Stizenbergen, Kryptogamen Badens (S ex herb. Rehm, K (2 parts); Cöln, im Garten der Artillerie Depots, *Juglans regia*, I.XI.1841 (B (2 parts)). — FRANCE: St. Cloud., ad truncos, det. Leveillé (L 910241-826); Jura, *Quélet*, herb. Fries (F-02385) 35686 (UPS). — ENGLAND: Shrewsbury, 1846, herb. W. A. Leighton as *X. polymorpha*/*X. digitata*, det. Dennis (K); at the bottom of a low post, ex herb. Forster (K). — SWITZERLAND: Ca. Ragaz (now Bad Ragaz), ad aceris truncus valde putridos, raro, autumnno, Fuckel's Fungi rhen. 2547 (K (2 parts)); Bern, 'in hort. meo', VIII.1837, ex herb. Shuttleworth (K). — ITALY: su ceppaie di pioppo nella selva Pisana, autumnno 1862, *X. cupressiformis*, Erbar critt. Ital. 278 (1278) (B, PAD, RO (herb. Ces.& herb. gen. (2) and 1 from same source s.n.), S); In sylvia Pisana, in truncis Populi, II.1862, *O. Beccari*, *X. cupressiformis*, ex herb. Sydow (S); Florenz, ad caudices Populneas in agro Florentino, *X. cupressiformis*, Beccari, herb. De Notaris ex herb. Fries (UPS). — HUNGARY: Budapest, IX., *H. Frigyes*, *X. polymorpha* f. *digitatum*, ex herb. Rehm (S). — Loci incognito: *Mougeot* in herb. Persoon (L 910270-592).

Fries's sanctioning description (1823) reads as follows: 'carnosa-suberosa, caespitosa, clavulis teretibus e rufescenti- atris, apice sterili acuto, stipitibus glabris'. He cites Bulliard's plate (Cham. de la France. pl. 220. 1791) which depicts what seems to be typical *X. polymorpha* in figs. A & B and possibly juvenile *X. digitata* in fig. C. Gmelin (1791) had already referred to this plate. Fries also cited a J. C. Schaeffer plate (Fung. Bav. et Palat. icon. 4: pl. 328. 1770 or Persoon ed. 1800), which is another juvenile state, possibly but doubtfully *X. digitata*. The cited Hoffmann plate (loc. cit.) is typical *X. digitata* s. auct., non ss. Lundell & Nannfeldt. Holmskjöld's plate (loc. cit.) of *Clavaria digitata* is cited under *X. polymorpha* (following Persoon, 1797).

Nannfeldt (Lundell & Nannfeldt, 1947) issued a strongly rooting *Xylaria* species under the name *X. digitata*. He wrote 'the spores of this gathering are much smaller (viz. 9–10 \times 4–5 μ) than the measurements given in most floras for *X. digitata*. A Fries specimen (from Skåne) shows, however, almost as small spores or 10–12 \times 5 μ .' There is no plate with the characters of *X. digitata* ss. Lundell & Nannfeldt among the Fries citations and there is no reason to believe that Fries accepted this taxon within his concept of *X. digitata*. A Fries specimen, labelled as *X. digitata* from Skåne, Söfvestad Parish, Krageholm (UPS, F-02379), is *X. hypoxylon* and may be the specimen referred to by Nannfeldt. Another Fries specimen (UPS, F-02378) from the same locality is immature but has characters suggesting *X. digitata* s. auct. or possibly an unusual form of *X. longipes*. Fries (1823) indicated he had seen the fungus in the living condition. The Lundell & Nannfeldt exsiccatum is here proposed as a new species. Fries cited Persoon (1797) with an exclamation mark, and since Persoon also was the first to

clearly separate *X. polymorpha* from *X. digitata*, a neotypification from Persoon's herbarium in Leiden would seem to be the most appropriate solution. Such a step would also conserve the name (ICBN, recommendation 7B.5 and preamble 1), since Nannfeldt's viewpoint has not been followed. Linnaeus (1753) wrote 'habitat in Sylvis australibus', which also justifies the selection of a type from outside Sweden. The Ray Society list of specimens in the Linnean herbarium includes no collections of *Clavaria digitata*. The various editions of Linnaeus's *Systema Naturae* clearly include more than one *Xylaria* species within *X. digitata*, but from Persoon onwards the use of the name became stabilized.

Fries (1828) discussed collections from all over the world, noting some variance although accepting them all as *X. digitata*. He described a β (var.) *rhizoides*, Wallroth in litt., which could possibly be what I herein describe as *X. friesii* but the description is not sufficient and also includes discrepancies. I have not seen material so named, and have not been able to locate any collection of *X. digitata* s. str. from outside Europe.

Persoon's (1799, loc. cit.) plates of *X. digitata* and *X. polymorpha* make it abundantly clear how he separates the two species. Brückmann (1725) discussed various 'fungo hypoxylon digitato's' at least one of which (from beer barrels ?) is, judging from the illustration, *X. digitata* sensu Persoon and this paper. Linnaeus (1753) cited this under *Clavaria hypoxylon* (= *X. hypoxylon*)! A Mérat specimen ex herb. Cooke (possibly det. Persoon, K) under *Hypoxylon digitatum* is *X. hypoxylon*.

Xylaria digitata was known to most European mycologists of the last century, although the name was also frequently misapplied as can be seen from the material studied. In particular immature specimens with sterile apices were often called *X. digitata*. Fries (1823) gave the habitat as 'ligna domestica fabrefacta, in hortis...' Wallroth (1833) gave the habitat and occurrence as 'ad ligna domestica fabrefacta in hortis rarius' and, for example, Rabenhorst (1840) followed suit 'an alten, faulenden Bretterzäunen an Gärten und Wohnungen, selten.' Berkeley (1836) described it as 'frequent' but later (Berkeley, 1860) changed it to 'not common'. Nitschke (1867) said 'obgleich selten, findet sich *X. digitata* doch über das ganze Gebiet (Germany) verbreitet an gezimmertem Holze, Bretter-Zäunen, Pfählen, alten Gartentischen, seltner an Baumstämmen.' Petch (1939) said it 'was apparently common fifty years ago, but it appears to be rare now. It seemed to have a preference for worked timber, and was said to occur frequently at the base of gate posts. Now that gate posts are treated with a preservative, or made of concrete, it does not get so much chance.'

Martin (1970) based his concept of *X. digitata* on American collections (*X. acuta* ? or *X. cornu-damae* ?) and his cultural data are thus difficult to evaluate. The same applies to the cytological studies by Greenhalgh & Roe (1984), who based their studies on a CBS culture. Dennis (1956) was unable to confirm any neotropical records of *X. digitata*. Petch (1924) revised Kew specimens labelled *X. digitata* from Sri Lanka (Ceylon) and found no correctly identified specimens. Some were referred to *X. nigripes* (Kl.) Cooke, others to *X. allantoides* (Berk.) Fr. Traverso (1913) distinguished between *X. cupressiformis* ss. Beccari and *X. digitata*, but as can be seen from his description the only significant difference is the fasciculate habit of the latter. Other Italian collections under *X. cupressiformis* belong with *X. aff. apiculata*. Dennis (1984) studied the classical Beccari material and referred it to *X. acuta* (see further discussion under that name). The material under *X. cupressiformis* has the same germ

slit morphology as *X. digitata* and the spore measurements fall within the range of that species (av. range for '*X. cupressiformis*' $17.2\text{--}18.2 \times 5.4\text{--}6.0 \mu\text{m}$). The deviating character in these (although differently labelled, all collections from 'selva Pisana' may be from the same source) collections is the apparently, unbranched, solitary stromata, but there is almost a gradation from typical *X. digitata* stromata to this form. Two collections of '*X. cupressiformis*' from the Bresadola herb. in S seem to be deviating *X. hypoxylon*.

Deviating material.—Munk (1957) described material from the Botanical Garden in Copenhagen having ascospores $18\text{--}25 \times 5\text{--}7 \mu\text{m}$. My measurements agree with those of Munk. The stromata are more robust than typical *X. digitata* but, on the other hand, are not typical *X. polymorpha*, and I am at present undecided on its status. A collection labelled as *X. digitata* in S (ex herb. Rehm) from Regensburg (*Hofman*, VII.1898) is macroscopically very close to typical *X. digitata* with more or less sterile apices, but the spores are $19.5\text{--}24.7 \times (5.7\text{--})6.3\text{--}6.9 \mu\text{m}$ (average $21.6 \times 6.4 \mu\text{m}$) and the germ slit is about one half the total spore length. A collection in Kew (Isle of Wight, *D. Reid*, 25.X.1980) is almost identical but with slightly larger spores. Both collections are at present filed with *X. polymorpha* but future studies may alter this situation. See also Rogers & Callan (1986) on *X. grandis* Peck and *X. polymorpha*.

Xylaria acuta Peck

Xylaria acuta Peck in Ann. Rep. N.Y. St. Mus. (for 1871) 25: 101. 1873. — Type specimen: U.S.A., New York, Lewis Co., Greig, on mossy maple prostrate trunk (inside label with *X. corniformis* overstroked and *acuta* n. sp. added), IX. C.H. Peck 163 (holotype NYS; isotype K).

Illustrations. — Rogers (1984: p. 24, figs. 7–9, p. 25, figs. 10, 21–22, p. 29, figs. 23–25, 29–32, 40).

Descriptions. — Rogers (1984: 23–24).

Specimens examined.—U.S.A.: Ohio, Morgan 366 (NYS). — CANADA: Ontario, Avon, 17.IX, *J.D. 49b*, ex herb. Rehm as *X. digitata* (S); cfr.: Manitoba, Gimli, at base of stump, 17.X(?).1928, *G.R. Bisby & A.H.R. Buller 4139* (IMI 13469).

Barr & al. (1986) state: 'This is a distinctive species of *Xylaria*: the stipe is villose as in *X. hypoxylon* Grev., but *Xylaria acuta* differs from the former by having larger ascospores containing a spiral rather than a straight germ slit.' Rogers (1984) described the germ slits as 'short and oblique' and the spores as $14.5\text{--}17.5(-19) \times 6\text{--}8 \mu\text{m}$ and he felt that when more information became available it could be possible to relegate *X. acuta* to a small spored variety of *X. digitata*. He reported occasional 'caespitose-digitate' collections of *X. acuta*. Only one collection was studied in culture and the distribution and biology of the species was considered insufficiently known. It is apparently a rare species.

Measurements of the spores obtained from the type are not in complete accordance with those cited by Rogers (1984), viz. $17.2\text{--}19.5(-20.7) \times 5.7\text{--}6.9 \mu\text{m}$ (av. $18.5 \times 6.5 \mu\text{m}$), which is within the spore length range of *X. digitata*. The spores are somewhat broader than in *X. digitata* but also rather collapsed. An Ohio collection (*Morgan 366*, NYS) has smaller spores than *X. digitata* ($14.9\text{--}17.2 \times 5.2\text{--}5.7 \mu\text{m}$, average $16.1 \times 5.5 \mu\text{m}$). *Xylaria acuta* is without doubt very closely related, if not conspecific, with *X. digitata* and the only relatively prominent character separating them seems to be the orientation of the germ slit, but even this

character could be misleading since so few collections of *X. acuta* have been studied, and fresh material of both species have never been compared. The ectostroma of *X. acuta* seems to be slightly lighter brown than in *X. digitata* collections, but this is only a minor, not very important difference. Material from Italy originally reported as *X. cupressiformis* and later renamed *X. acuta* by Dennis (1984) almost bridges the two taxa. Dennis concluded that, in its original sense, *X. cupressiformis* had to be considered a synonym of *X. hypoxylon*. (See also discussion under *X. digitata*). The type material of *X. corniculata* Sacc. (*J. Gillet*, PAD) is very close to *X. digitata/acuta* but more material is needed to establish with certainty the identity of this African taxon.

Xylaria cornu-damae (Schw.) Fr.

Sphaeria cornu-damae Schw. in Trans. Am. phil. Soc. N.S. 4: 189. 1832. — *Xylaria cornu-damae* (Schw.) Fr. in Nov. Acta. Soc. Sci. Upsal. III. 1: 128. 1851. — *Xylosphaera cornu-damae* (Schw.) Dennis in Kew Bull. 13: 103. 1958. — Type specimen: (U.S.A.) Bethlehem, ex herb. Schweinitz & herb. Berkeley (isotype, K).

Xylaria digitata var. *tenuis* Peck in Ann. Rep. N.Y. State Mus. 50: 133 (for 1896). 1897. — Type specimen: U.S.A.: New York, Hamilton Co., Adirondack Mts, Piseco, on *Acer saccharinum* (now *A. saccharum*), IX, C.H. Peck (NYS; not seen (studied by Rogers, 1984). — A full synonymy of this species is still not at hand.

Misapplied name.—*Xylaria digitata* sensu early american authors.

Description.—Rogers (1984: 27–30).

Illustrations.—Rogers (1984: figs. 1–5, 14, 17–18, 33–39).

Specimens examined (selected).—No data (probably ex Schweinitz, herb. Berkeley (K); U.S.A.: Pa., West Chester, on old logs, VII.1883, *Everhart & Haines* 1331, Ellis, North American Fungi (K (2)); on rotten wood, *W.H. Long* Jr., in Ellis & Everhart's Fungi Columbiana 1800, ex herb. Sydow (S); Flora of New York, Fort Edward, 1867, *E.C. Howe s.n.*, as *X. acuta* Peck (det.?)/*X. scruposa* (det. J. D. Rogers) (NYS).

Xylaria cornu-damae is a characteristic species. It retains, even in very mature specimens, a white-wash appearance on the slender fertile clubs. The spores are about the same length as those of *X. digitata* or somewhat longer, but typically much more narrow.

Xylaria friesii Læssøe, *spec. nov.*—Figs. 7–9, 15

A. X. bulbosa stipite ad basin non bulboso, fissuris germinationis brevirostris, apparatus apicali asci maiore differt. Stromata ex substrato subterraneo orientia, usque 47.5 cm longa; partes fertiles 10–25 × 2.5–4(–7) mm, brunneae, laeves sed circum perithecia protuberantes; entostroma album, solidum. Apparatus apicalis asci in mixtura Melzeri caerulescens, (2–)2.3–2.6 × 2.3–2.6 μm; ascospores pallide olivaceo-brunneae, inaequilaterales, (8.6–)9.2–10.6(–11.2) × 3.4–4.3(–4.6) μm, fissura germinationis plerumque ventralis, per 1/3 – 1/2 longitudinem sporae extensa. — Typus: Sweden, Västergötland, Backa Parish, 22.IX.1945, *F. Karlvall*, in Fungi. exs. Suecici 1458 (*X. digitata*) (holotype S, isotypes C & K).

Stromata dichotomously branched in several orders, rooting, only very short stipe part and fertile parts above soil level, total length up to 47.5 cm (according to notes on fresh material), subterranean and sterile parts smooth, brown to purplish brown from appressed felt, in immature condition with orange brown apices, fertile parts brown, smooth, more or less furrowed, apices sterile or substerile, flattened, with prominent, mammiform perithecial outlines, some-

times restricted to a very small area of the upper parts, 10–25 × 2.5–4(–7) mm; entostroma massive, white or pale wood brown in old stromata; ostioles papillate, perithecia sphaerical, 0.4–0.7 mm diam.

Asci mostly 8-spored, fertile part cylindrical, with obliquely uniseriate spores, 60–75 µm, stipe 35–45 µm; apical apparatus (2–)2.3–2.6 × 2.3–2.6 µm, stained clear azure to medium blue in Melzer's reagent, barrel shaped, with prominent flaring apical rim; spores light to subopaque olive brown, inequilaterally ellipsoid-fusiform, often pinched at one end, rarely with a remnant of primary appendage, (8.6–)9.2–10.6(–11.2) × 3.4–4.3(–4.6) µm (average range 9.4–10.1 × 4–4.3), germ slit variously positioned, although mostly ventral, $\frac{1}{3}$ – $\frac{1}{2}$ of total spore length.

Additional specimens examined.—SWEDEN: Västergötland, Göteborg, Hisingen, Backaplan, bland träbitar och sågspån. Längsta kontrollerade ex. var över 47.5 cm, 9.X.1945, F. Karlvall 2387 (S). — GERMANY: Schleswig-Holstein, Heide, rooting in sandy soil under *Picea* (and *Betula*?), 14.VII.1988, G. Struckhoff s.n. (C). — ENGLAND: Wiltshire, Burbage, 25.IX.1970, H. Mary Morgan (K).

It is impossible from the few available collections to form any definite conclusions about the ecological niche of this species. The available material is rather uniform and all stromata show a strongly rooting basal part. Apart from the rooting base *X. friesii* differs from *X. bulbosa* in shorter germ slit and larger perithecia. See also discussion of deviating specimen under *X. guepini*.

Xylaria bulbosa (Pers.: Fr.) Berk. & Br.—Figs. 10–13, 16

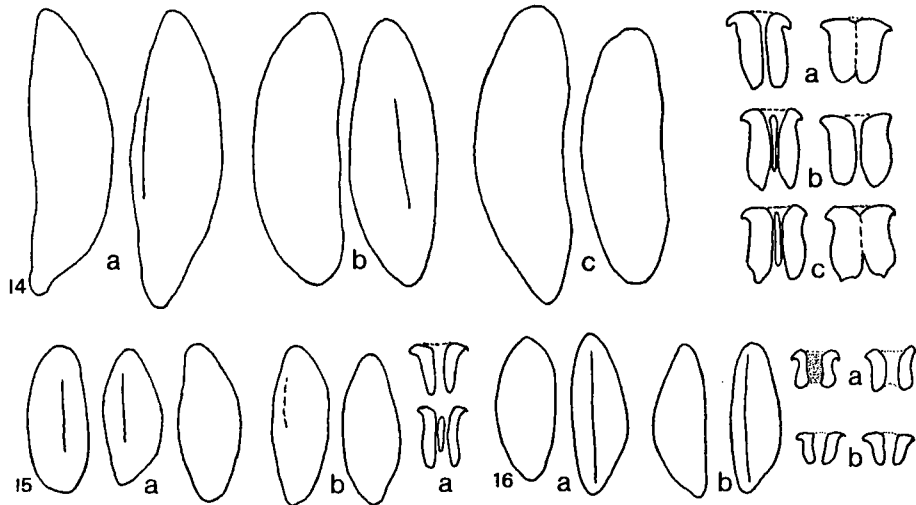
Sphaeria bulbosa Pers. in Gmelin Linnaeus Systema naturae (ed.13) 2, 2: 1474. 1791. — *Sphaeria bulbosa* Pers.: Fr., Syst. mycol. 2: 327. 1823. — *Xylosphaera bulbosa* (Pers.: Fr.) Dumortier, Comment. bot.: 91. 1822. — *Hypoxylon bulbosum* (Pers.: Fr.) Rabenh., Deutschlands Kryptogamen-Flora 1: 222. 1844. — *Xylaria bulbosa* (Pers.: Fr.) Berk. & Br. in Berk., Outl. Brit. fungol.: 385. 1861 — Type specimen: (Germany), prope (?) (Göttingen), Persoon 227, ex herb. Persoon (holotype L 910263–983).

Selected illustrations.—Persoon (1799), Obs. mycol. 2: pl. 1, fig. 1 a–d; Berkeley (1860: pl. 24, 2).

Selected description.—Nitschke (1867: 10–11).

Stromata clavate with apices acute, sterile or anamorph bearing, rarely antler-shaped with several sterile apices, arising singly or rarely fasciculate from swollen sclerotoid 'bulbs' with firmly attached coniferous litter, 5–35 mm across, flesh massive, white; total length 30–60 mm with the fertile part 15–25 mm long and 3–7(–23) mm broad, smooth, relatively light brown, grey brown to dark brown, surface densely covered in mammiform perithecial outlines, no apparent ectostromal squamules present and crust very thin, entostroma massive, white or pale yellow to pale brown throughout; stipe smooth, wrinkled, more or less compressed, 2–3 mm broad, 'bulb' with more or less evident purplish felt (initially orange yellow ?); ostioles distinct, rounded papillate, perithecia sphaerical, 0.2–0.3(–0.4) mm diam.

Asci 8-spored, fertile part cylindrical with obliquely uniseriate spores, 70–75 µm long and stipe 10–15 µm long (very few observed with stipes intact); apical apparatus 1.3–1.7 × (1.7–)2–2.6 µm, staining dark violaceous blue in Melzer's reagent, barrel-shaped or tapering towards the base with flaring apical rim; spores light golden brown to light reddish brown, inequilaterally ellipsoid-fusiform with ventral side straight or slightly convex, one end often attenuated and constricted, rarely with remnants of primary appendage, 9.2–11.9(–13.9) × 3.4–4.6(–5.3) µm (average range 10.1–11.3 × 3.8–4.5); germ slit ventral, almost full length (ca. $\frac{4}{5}$), relatively inconspicuous.



Figs. 14–16. Ascospores and apical apparatusi stained in Melzer's reagent. — 14. *Xylaria digitata*. — a. Neotype, ex Herb. Persoon (L). — b. Ex herb. Shuttleworth (K). — c. '*X. cupressiformis*', Selva Pisana (RO). — 15. *X. friesii*. — a. Isotype (K). — b. Burbage (K). — 16. *X. bulbosa*. — a. Holotype, ex herb. Persoon (L). — b. *Rabenhorst 133* (K).

Specimens examined.—ENGLAND: Lucknam Grove (Wiltshire), in pinetis, X.1859, *Broome*, in *Rabenhorst*, *Fungi europ.* 133 (C, K(2), L(2), PAD, RO(2), S(2), UPS); *ibid.*, 6.X.1859, ex herb. *Broome* (K); *ibid.*, 10.X.1959, ex herb. *Broome* (K); *ibid.*, X.1859 (one marked 2009), ex herb. *Broome*, *Plowright & Currey* (K(5, 2, and 1)); *ibid.*, X.1857 (probably an error) and 19.X.1860, *Broome*, ex M.R. *Tulasne* 1873 (PC); *ibid.*, 22.X.1859, ex herb. *Broome* (E, K(2)); *ibid.*, 17.X.1860, ex herb. *Broome* (E(2), K); *ibid.*, s.d. (E(2)); *ibid.*, X.1860, ex herb. *Broome*, herb. E. *Fries* (F-02380) 35681 (UPS); *Berkeley* misit, herb. E. *Fries* (F-02381) 35682 (UPS); *ibid.*, 1866 (anamorph), ex herb. *Broome* (K); near the Rocks, *Marshfield*, 13.IV.1866, ex herb. *Broome* (K); *Bathford* fir plantation, s.d., ex herb. *Broome* (K) and some unlabelled *Broome* material (K). — FRANCE: sous chêne (*Quercus*), automne 1870, *L. Quélet* (PC, partly *X. digitata* and the substrate can thus not be trusted); sapins de la *Chafrerie*, VI. 1870, *L. Quélet* (PC, anamorph); sapins des *Epais*, 10.IX.1877, *L. Quélet* (PC); Jura, *Abbevillers*, IX.1872, *L. Quélet*, herb. *Fries* (F-02388) 35928 (UPS). — DENMARK: Fyn, *Klingstrup*, inter fol. *abietina* (*Picea abies* litter and not *Pinus silvestris* as stated in *Lind* (1913)), 20.XI.1864, *E. Rostrup s.n.* (CP, K).

The place of publication of *Sphaeria bulbosa* is normally given as in *Persoon* (1799) but there are at least three earlier publications, all cited by *Persoon* himself. The typification is straight forward in this case. *Fries* (1823) refers directly to *Persoon*'s description and figure and there is an authentic collection in the *Persoon* herbarium at *Leiden*.

Xylaria bulbosa ss. *Miller* (e.g. 1942) and ss. *Rogers* (1983) are not conspecific with the original species. See discussion under *X. bulbosa* ss. *Rogers*. *Petch* (1939) suggested that *X. bulbosa* could be a form of *X. hypoxylon* because of a similarity in spore size. However, there are few other similarities and there are also differences in spore shape and colour and in germ slit morphology.

A specimen in the Persoon herbarium (L 910222-3645) is immature *Poronia oedipus* Mont., but there is no indication that the material of this southern species is connected with the original from Göttingen.

Xylaria bulbosa, like *X. digitata*, seems not to have been collected this century.

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REFERENCES

- BARR, M.E., ROGERSON, C.T., SMITH, S.J. & HAINES, J.H. (1986). An annotated catalog of the pyrenomycetes described by Charles H. Peck. *In* Bull. N.Y. St. Mus. 459.
- BERKELEY, M.J. (1836). Fungi. *In* W.J. Hooker, The English flora of Sir James Edward Smith. Vol. 5 (2): 1–386. London.
- (1860). Outlines of British fungology. London.
- BERTAULT, R. (1984). Xylaires d'Europe et d'Afrique du Nord. *In* Bull. trimest. Soc. mycol. Fr. 100: 139–175.
- BRÜCKMANN, F.E. (1725). Epistola de fungo hypoxylō digitato. Helmstadt.
- DENNIS, R.W.G. (1956). Some Xylarias of tropical America. *In* Kew Bull. 1956: 401–444.
- (1968). British Ascomycetes. Lehre.
- (1984). Some Ascomycetes from the Maghrib, North Africa. *In* Kew Bull. 39: 759–770.
- FRIES, E.M. (1821). Systema mycologicum 1. Greifswald.
- (1822). Systema mycologicum 2, sect. 1. Greifswald.
- (1823). Systema mycologicum 2, sect. 2. Greifswald.
- (1828). Elenchus fungorum 2. Greifswald.
- GMELIN J.F. (1791). Caroli à Linné, Systema naturae (ed. 13).
- GREENHALGH, G.N. & ROE, G.M. (1984). Conidial structure in *Xylaria* and related genera. *In* Subramanian, C.V. (ed.). Taxonomy of Fungi. Proceedings of the International symposium on Taxonomy of Fungi. Part 2: 365–378, pl. I-VII. Madras.
- KRIEGLSTEINER, G.J. (1990). Über Vorkommen, Verbreitung und Ökologie der Gattung *Xylaria* in der Bundesrepublik Deutschland und einigen angrenzenden Landstrichen Mitteleuropas. *In* APN, Mitteilungsbl. 'Arbeitsgemeinschaft. Pilzk. Niederrhein' 8 (1): 38–59.
- LIND, J. (1913). Danish fungi as represented in the herbarium of E. Rostrup. Copenhagen.
- LINNAEUS, C. (1753). Species plantarum, ed. 1.
- LUNDELL, S. & NANNFELDT, J.A. (1947). Fungi exsiccati suecici praesertim upsalienses. Fasc. XXIX-XXX. Uppsala.
- MARTIN, P. (1970). Studies in the Xylariaceae: VIII. *Xylaria*. *In* J.S. Afr. Bot. 36: 73–138.
- MILLER, J.H. (1942). South African Xylariaceae. *In* Bothalia 4: 251–272.
- MUNK, A. (1957). Danish Pyrenomycetes. *In* Dansk bot. Ark. 17 (1): 1–491.
- NITSCHKE, T. (1867-1870). Pyrenomycetes Germanici. Breslau.
- PERSOON, C.H. (1797). Commentatio de fungis claviformibus. Leipzig.
- (1799). Observationes mycologicae 2. Leipzig.

- PETCH, T. (1924). Xylariaceae Zeylanicae. *In* Ann. R. bot. Gdns Peradeniya 8: 119–166.
- (1939). *Xylaria*. *In* Naturalist, Hull 1939 (989, 762): 157–159.
- RABENHORST, G.L. (1840). Flora lusatica 2. Kryptogamen. Leipzig.
- ROGERS, J.D. (1983). *Xylaria bulbosa*, *Xylaria curta*, and *Xylaria longipes* in continental United States. *In* Mycologia 75: 457–467.
- (1984). *Xylaria acuta*, *Xylaria cornu-damae*, and *Xylaria mali* in continental United States. *In* Mycologia 76: 23–33.
- ROGERS, J.D. & CALLAN, B.E. (1986). *Xylaria polymorpha* and its allies in continental United States. *In* Mycologia 78: 391–400.
- TRAVERSO, J.B. (1913). Flora italica cryptogama. Pars 1: Fungi. Pyrenomycetae.
- WALLROTH, F.G. (1833). Flora cryptogamica germaniae 2. Nührenberg.