ILLINOIS FUNGI IX. *ZOPFIELLA LUNDQVISTII* SP.NOV., A NEW ASCOMYCETE FROM SUBMERGED WOOD

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During a study of fungi decomposing submerged plant debris in freshwater swamps, we encountered an undescribed species of *Zopfiella* Winter on submerged wood.

Zopfiella lundqvistii Shearer & Crane sp.nov.

Etym: Honouring Nils Lundqvist for his excellent treatment of the Nordic Sordariaceae.

In ligno saprobiotica. Coloniae effusae, floccosae, hyalinae, griseo-nigrescentes. Mycelium plerumque immersum, e hyphis ramosis, septatis, subhyalinis, colorem brunneum assumentibus compositum. *Ascocarpi* solitarii vel gregarii, superficiales vel in substrato immersi, floccis septatis, flexuosis, subhyalinis tecti, cleistotheciales, globosi, pallide brunnei, (158) 173–415 (–436) μm diam, irregulariter dehiscentes. Peridium pseudoparenchymaticum, membranaceum, semipellucidum, pallide brunneum, 14·4–24·0(–29·0) μm crassum. Paraphyses nulli. *Asci* fasciculati, octospori, primo elongati, denique clavati, in medio latissimi, stipitati, evanescentes, (60–)67–84(–89) × 17·0–24·0 μm. *Ascosporae* biseriatae, primo hyalinae, continuae, cylindricae, utrinque rotundatae, demum obpyriformes, super medium constrictae, transverse uniseptatae, cellula apicali expansa et triangulari evadente, brunnea, 21·6–30·0 μm longa, 19·0–30·0 μm lata, ad 2·4–2·8 μm attenuata, basali instar pedicelli, persistente hyalina, tenuiter tunicata (10·4–)12·0–14·4(–15·6) × 2·4–4·8 μm denique evanescente; maturae obscure brunneae, crasse tunicatae, triangulares, lateribus frequenter concavis, angulis rotundatis, alio truncato, cicatrice refractili, ubi basalis affixa, notato, alio poro germinativo perforato, alio surde rotundato.
Holotypus: ILLS 36931, Isotypus: NY.

Saprobic on wood. *Colonies* effuse, floccose, hyaline, becoming greyish black. *Mycelium* mostly immersed, composed of branched, septate, subhyaline to brown hyphae. *Ascocarps* solitary to gregarious, superficial or immersed in substrate, covered with septate, flexuous, subhyaline hairs, cleistothecial, globose, light brown, (158–)173–415(–436) μm diam, irregularly dehiscing. *Peridium* pseudoparenchymatous, membranous, semitransparent, light brown, 14·4–24·0(–29·0) μm thick. *Paraphyses* lacking. *Asci* fasciculate, 8-spored, elongate at first, becoming clavate, broadest in the middle, stipitate, evanescent, (60–)67–84(–89) × 17·0–24·0 μm. *Ascospores* biseriate, at first hyaline, 1-celled, cylindrical and rounded at both ends, then obpyriform, constricted above the middle, becoming transversely 1-septate, the apical cell enlarging and becoming triangular, brown, 21·6–30·0 μm long, 19·0–30·0 μm wide at its broadest tapering to 2·4–2·8 μm wide, basal cell as though pedicellate, remaining hyaline, thin-walled, (10·4) 12·0–14·0–14·4(–15·6) × 2·4–4·8 μm, finally disintegrating. Mature ascospores dark brown, thick-walled, triangular, sides often concave, corners rounded, one truncate and bearing a refractile scar at the former point of attachment of basal cell, one bearing a germ pore, and one broadly rounded.

Holotype: a dried culture isolated from balsa wood blocks (*Ochroma pyramidale* (Cav.)Urb.), submerged in Elvira Cypress Swamp (Deer Pond), Johnson County, Illinois, 28 June 1974, C. A. Shearer & J. L. Crane, CS-460-1. ILLS 36931. Isotype: NY. Culture: ATCC 34976, CS-460-1. *Additional material examined:* On submerged balsa wood CS-460-3, ILLS 36932 from Elvira Cypress Swamp, 20 May 1974; CS-460-5, ILLS 36933 from Heron Pond Cypress Swamp, 13 Nov. 1974; CS-460-6, ILLS 36934 from Pine Hills Swamp, 20 June 1975.

The genus *Zopfiella* in the Sordariaceae was established by Winter (1887) and is characterized by the presence of cleistothecia and ascospores which have a dark upper and a hyaline basal cell. Since in the type species of *Zopfiella*, *Z. tabulata* (Zopf)Winter, the upper dark cell is septate, Cain (1956) established a new genus, *Tripterospora* Cain, for cleistocarpous species with ascospores that have a dark non-septate upper cell and hyaline basal cell.

Malloch & Cain (1971) in redefining the genera, distinguished *Zopfiella* from *Tripterospora* by the shape of the undifferentiated ascospore which they considered ellipsoidal or cylindrical in *Zopfiella* and clavate in *Tripterospora* and by the hyaline basal cell which they considered late-

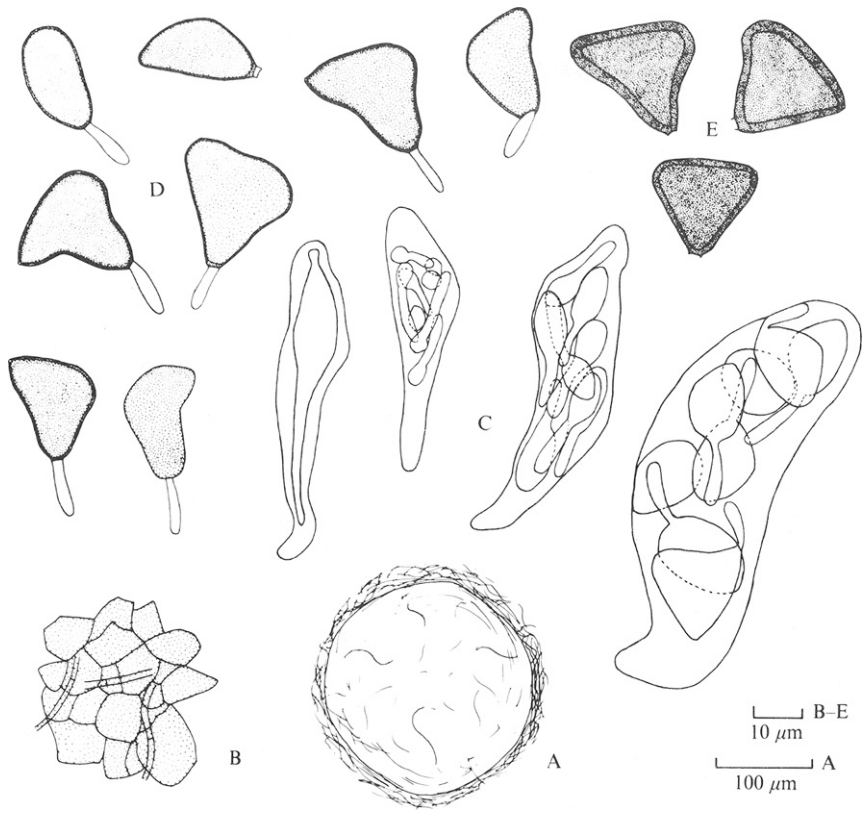


Fig. 1, A–E, *Zopfiella lundqvistii*. A, Ascocarp; B, peridium in horizontal view; C, asci in various stages of development; D, immature ascospores; E, mature ascospores.

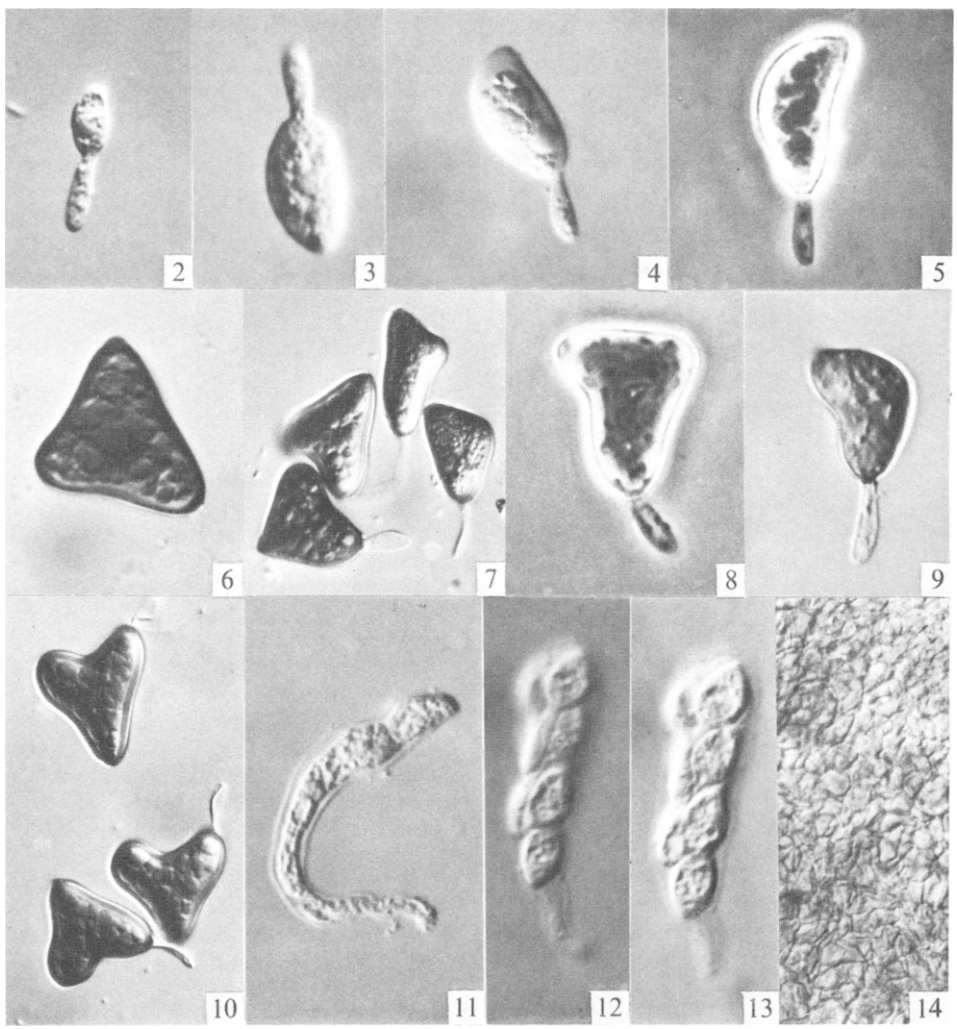
differentiated, broad and persistent in *Zopfiella* and early-differentiated, narrow and delicate in *Tripterospora*. They did not believe the presence or absence of a septum in the dark upper cell to be a generic character. As a result of this redefinition, they transferred all of the species names of *Tripterospora* with smooth-walled ascospores, except *T. longicaudata* Cain, to *Zopfiella*. Two species with rough-walled spores, *T. spinosa* Cailleux and *T. verruculosa* Cailleux were transferred to *Echinopodospora* Robison (Malloch & Cain, 1971).

Lundqvist (1972), in his treatment of these two genera, reported that the hyaline basal cell was always formed at a late stage in both genera. He also pointed out that the clavate spore type could be found in species of *Zopfiella* and the non-clavate spore type could be found in 'true' Tripterosporae. He chose to maintain the separate genera on the basis of septation of the dark upper cell, even though he considered this a dubious generic character, rather than on the morphology of the developing ascospore.

Von Arx (1973) did not consider septation of the dark upper cell significant enough to distinguish genera and transferred the name of the type species, *T. longicaudata*, to *Zopfiella*.

We agree with Malloch & Cain (1971) and von Arx (1973) that septation of the dark upper cell is not significant at the generic level. In addition, when all of the species included in *Zopfiella* and *Tripterospora* are considered, there is no distinct division into two groups with respect to time of basal cell differentiation, shape of the undifferentiated ascospore or width of the hyaline basal cell but instead there is a continuum of these characters among the species. This can be well illustrated by considering the shape of the developing ascospores of selected species. Developing ascospores may by pyriform (*Z. pilifera* Udagawa

& Furuya, 1972) to cylindrical (*Z. matsushimae* Udagawa & Furuya, 1976) to slightly clavate (*Z. attenuata* Udagawa & Furuya, 1974) to clavate (*Z. longicaudata* and *Z. lundqvistii*). The shape of the hyaline basal cell of the mature ascospore reflects the shape of the developing ascospore and the position of the septum. Pyriform and cylindrical immature ascospores have wide hyaline basal cells at maturity, whereas clavate to obpyriform ascospores have narrow hyaline basal cells. Thus, it would not be justifiable to maintain *Tripterospora* as a genus distinct from *Zopfiella* based on characters which do not differ distinctly and which have intermediate forms. Even though the



Figs. 2–14, *Zopfiella lundqvistii*.

Fig. 2, developing ascospore (×850); Fig. 3, developing ascospore (×965); Fig. 4, developing ascospore (×680); Fig. 5, developing ascospore (×680); Fig. 6, mature ascospore (×748); Fig. 7, mature ascospores (×390); Fig. 8, mature ascospore illustrating the pore (×748); Fig. 9, nearly mature ascospore with pedicellate hyaline basal cell (×935); Fig. 10, mature ascospores (×595); Fig. 11, developing ascus (×1020); Fig. 12, ascus with developing ascospores (×850); Fig. 13, ascus with developing ascospores (×935); Fig. 14, peridium in horizontal view (×425).

immature ascospores of *Z. lundqvistii* are similar to several species formerly included in *Tripterospora* in being clavate to obpyriform and in developing into mature ascospores with narrow hyaline basal cells which do not persist, we consider it to be properly placed in *Zopfiella*.

Zopfiella lundqvistii is similar to other species in the genus in centrum and ascospore development. It is, however, distinguished from all previously described species of *Zopfiella* in the morphology of the ascospores which are distinctly triangular and thick-walled. In specimens growing on submerged woody substrates, the hyaline basal cell disintegrates at maturity and the ascospores bear a strong resemblance to the deltoid, dematiaceous conidia of a pycnidial species, *Readeriella mirabilis* H. & P. Sydow.

In addition to *Z. lundqvistii*, three other species of *Zopfiella* have been collected from aquatic environments. These are *Z. latipes* (Lundqvist) Malloch & Cain from brackish and freshwater (Shearer, 1972, sub *Tripterospora*), *Z. leucotricha* (Speg.)Malloch & Cain from freshwater (Shearer, 1972, sub *Tripterospora*) and *Z. marina* Furuya & Udagawa (1975) from marine mud.

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TWO BAMBUSICOLOUS RUST FUNGI NEW TO BRITAIN

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During examination of British material of *Arundinaria* (*Semiarundinaria*) *fastuosa* (Mitford) Makins., in the Kew Herbarium, Dr C. H. Hubbard noticed two sheets of this bamboo which were infected with a rust. Both herbarium specimens originated from numbered plants grown in the open at the Gardens, Wakehurst Place, Ardingly, East Sussex and were collected during May and November 1961. The rust was identified as *Puccinia kusanoi* Diet., which is known to occur in Japan, China, and Taiwan. A recent visit to Wakehurst to see if the rust was still present on this host was unsuccessful, as only one of the numbered plants could be traced and this had died; a thorough search of other plants belonging to this species failed to show any sign of infection and it would seem possible that *P. kusanoi* has died out at Wakehurst during the past ten years. However while searching for the latter, stands of *A.* (*Pseudosasa*) *japonica* Sieb. & Zucc. ex Steud. were found with rust pustules which were subsequently determined as those of *P. longicornis* Pat. & Har., also known from China and Japan. Since the host plants are propagated vegetatively it is possible that these rusts may be widely distributed in Britain and elsewhere in Europe and