

## The genus *Acanthostigma* (Tubeufiaceae, Pleosporales)

Martina Réblová<sup>1</sup> & Margaret E. Barr<sup>2</sup>

<sup>1</sup> Institute of Botany, Dept. Plant Taxonomy and Biosystematics,  
Academy of Sciences, CZ-252 43 Průhonice, Czech Republic

<sup>2</sup> 9475 Inverness Road, Sidney, British Columbia, V8L 5G8 Canada

Réblová, M. & M. E. Barr (2000). The genus *Acanthostigma* (Tubeufiaceae, Pleosporales). – *Sydowia* 52(2): 258–285.

The genus *Acanthostigma* is redescribed on the basis of the re-examination of type material of *A. perpusillum*, type species of the genus. It is placed in the Tubeufiaceae and is characterized by having dark, setose ascomata, cellular pseudoparaphyses, bitunicate asci, hyaline, multiseptate, cylindrical-fusiform to elongate fusiform ascospores, *Helicosporium* and *Helicomycetes* anamorphs and occurrence on rotten wood or on stromata of other ascomycetes. Six species are accepted in *Acanthostigma*. *Acanthostigma ellisii*, *A. longisporum*, *A. perpusillum*, *A. revocatum*, *A. minutum* and *A. scopulum* are redescribed and illustrated on the basis of re-examination of type material. A new combination for *A. longisporum* is proposed. A key to species in *Acanthostigma* is provided. *Acanthostigma filisporum* is excluded and its affinity to the Niesliaceae is discussed. *Acanthostigmina* is relegated to synonymy with *Acanthostigma*. Two species previously referred to *Acanthostigmina* and one to *Tubeufia* sect. *Acanthostigmina* are not accepted in *Acanthostigma* and are transferred to *Taphrophila* in the Tubeufiaceae and proposed as three new combinations *T. hebridensis*, *T. miscanthi* and *T. tri-chella*.

Keywords: Ascomycetes, *Helicosporium*, *Helicomycetes*, mycosaprobe, Niesliaceae, *Taphrophila*, Tubeufiaceae, systematics.

The systematic position of *Acanthostigma* De Not. (De Notaris, 1863) in relation to the nature of asci and hamathecium has been addressed several times (Müller, 1965; von Arx & Müller, 1975; Barr, 1977; 1980; 1990; Eriksson & Hawksworth, 1998). The discrepancies in the literature, i.e. whether the fungus possesses unitunicate or bitunicate asci were a consequence of the impossibility to examine the type material of *Acanthostigma perpusillum* De Not., the type species of the genus, that von Arx & Müller (1975) considered lost.

De Notaris (1863) described *A. perpusillum* from inner side of the bark of *Cerasus* sp. from Italy. The fungus was characterized by superficial, setose ascomata with a fragile wall and cylindrical-clavate asci containing eight, hyaline, 5-septate, ca. 30 µm long ascospores. Later, Saccardo (1883) gave full sizes for asci (70 × 5 µm) and ascospores (28–30 × 5.5–5 µm). He was probably the last to examine

the type material of *A. perpusillum*. Berlese (1894) based his description and illustration of *A. perpusillum* on type material of *A. decastylum* (Cooke) Sacc. (Tab. 102, fig. 2. 'Ex specimen orig. *Acanth. decastyli* a cl. Cooke benevole communicatis'). Berlese (1894) gave sizes for asci ( $65\text{--}75 \times 10\text{--}12 \mu\text{m}$ ) and ascospores ( $22\text{--}25 \times 4\text{--}5 \mu\text{m}$ ) and listed *Acanthostigma decastylum* [ $\equiv$  *Chaetosphaeria decastyla* (Cooke) Réblová & W. Gams, Réblová & Gams, 1999], *Lasiosphaeria subvelutina* Ellis & Everh. and *Zignoëlla cariosa* (Cooke & Ellis) Sacc. [= *Chaetosphaeria ovoidea* (Fr.) Constantinescu & al., Réblová & Gams, 1999] as synonyms of *A. perpusillum*.

According to the original illustration of *A. perpusillum* (De Notaris, 1863), von Arx & Müller (1975) suggested that *Acanthostigma* might be a synonym of a leaf biotroph *Nematostoma* H. Syd. & P. Syd. of the Pseudoperisporiaceae (Barr, 1997). Müller (1965) and Barr (1990; 1993; 1997) interpreted the asci of *A. perpusillum* as unitunicate and placed *Acanthostigma* in the Trichosphaeriaceae.

A recent examination of the newly discovered type material of *Acanthostigma perpusillum* (RO) revealed that the fungus possesses minute, dark, deeply collapsing pseudothecia covered with short, opaque pointed setae, numerous cellular pseudoparaphyses, clavate, bitunicate asci and eight hyaline, transversely multiseptate ascospores. It matches the circumscription of *Acanthostigmina* Höhn. *Acanthostigmina* was erected by Höhnel (1909) for a single species *Lasiosphaeria minuta* Fuckel and was considered closely related to *Acanthostigmella* Höhn. Later, von Arx & Müller (1975) considered *Acanthostigmina* and *Acanthostigmella* to be synonymous with *Tubeufia* Penzig & Sacc. Barr (1980) accepted *Acanthostigmina* as a synonym of *Tubeufia* in the Tubeufiaceae and distinguished it as an independent section among the three others as *Tubeufia* sect. *Acanthostigmina* (Höhn.) M. E. Barr, while *Acanthostigmella* with the type species *A. genuflexa* Höhn. proved different from *Tubeufia* and was attributed to the Herpotrichiellaceae (Barr, 1977; Crane & al., 1998). Recently, Crane & al. (1998) returned *Acanthostigmina* to generic rank within the Tubeufiaceae. Because both *Acanthostigma* and *Acanthostigma perpusillum* (De Notaris, 1863) have priority as generic name and specific epithet over *Acanthostigmina* (Höhnel, 1909) and *Acanthostigmina minuta* [Basionym: *Lasiosphaeria minuta* (Fuckel, 1870)], therefore, *Acanthostigmina* is relegated to synonymy.

*Acanthostigma* is a well-characterized genus in the Tubeufiaceae. It encompasses lignicolous saprobes or mycosaprobites with minute, setose, dark ascomata, dark, thick-walled setae, bitunicate asci, narrow cellular pseudoparaphyses and hyaline, cylindrical-fusiform to elongate fusiform, transversely multiseptate ascospores arranged in fascicles. The *Helicosporium aureum* (Corda) Linder ana-

morph has been linked to *Acanthostigma scopulum* (Cooke & Peck) Peck [as *Tubeufia scopula* (Cooke & Peck) M. E. Barr; Barr, 1980], and *Helicomyces* sp. is linked to *A. minutum* (Fuckel) Sacc. in the present study.

According to the treatments of *Acanthostigma* by Berlese (1894), Ellis & Everhart (1892), Saccardo (1883; 1891; 1895; Saccardo in Mussat, 1901; Saccardo in Trotter, 1926), Saccardo & Sydow (1899), Saccardo & Traverso (1910) and Saccardo & Trotter (1913), the genus accommodated ca. 75 rather unrelated elements. Some were recently placed in Loculoascomycetes, e.g. *Chaetothyrium* Speg. (Barr, 1993), *Nematostoma* Syd. & P. Syd. including *Aphanostigme* Syd. as its synonym (Barr, 1968; 1977; Müller, 1965; Rossman, 1987) and *Acanthophiobolus* Berl. (Walker, 1972; 1980), or Hymenoascomycetes, e.g. *Cercophora* Fuckel (Barr, 1993), *Chaetosphaeria* Tul. & C. Tul. (Réblová & Gams, 1999) and *Niesslia* Auersw. (Winter, 1887). Other species that were placed in the genus require further revision and possibly also reclassification.

The goal of this study is the clarification of the systematic position of *Acanthostigma* on the basis of the re-examined type material of *A. perpusillum*. In the present paper, six species of *Acanthostigma* are accepted. A new combination is proposed for *Acanthostigma longisporum* (Remler) Réblová & M. E. Barr. *Acanthostigma ellisii* Sacc & Syd., *A. longisporum*, *A. perpusillum*, *A. revocatum* Sacc., *A. minutum* and *A. scopulum* are redescribed and illustrated on the basis of their type material.

*Acanthostigma filisporum* M. E. Barr is excluded from the genus and its affinity to the Niessliaceae is discussed. Two species referred by Crane & al. (1998) to *Acanthostigmina* and another one referred by Hsieh & al. (1998) to *Tubeufia* sect. *Acanthostigmina* are saprobes with a strong preference for culms and leaves of Cyperaceae and Poaceae. These species are not accepted in *Acanthostigma* and are transferred to the closely related *Taphrophila* in the Tubeufiaceae as *T. hebridensis* (Dennis) Réblová & M. E. Barr, *T. miscanthi* (W. H. Hsieh, C. Y. Chen & A. Sivan.) Réblová & M. E. Barr and *T. trichella* (Sacc., E. Bommer & M. Rousseau) Réblová & M. E. Barr.

### Material and methods

Ascomata from herbarium specimens were rehydrated in 3% KOH. The asci, ascospores and interthelial filaments were studied in lactic acid, water and Melzer's reagent. Measurements were taken in Melzer's reagent. The structure of the perithecial wall was studied from freehand sections of dried material cut under the dissecting microscope and mounted in lactic acid.

## Taxonomy

***Acanthostigma*** De Not., Sfer. Ital., Cent. I, Fasc. 1, 2: 85, 1863.

= *Acanthostigmia* Höhn., Sitzungsber. Kaiserl. Akad. Wiss., Math. – Naturwiss. Cl., Abt. 1, 118: 1499, 1909.

Pseudothecia superficial, globose to subglobose or conical, vinaceous or reddish-brown to dark brown, sometimes covered with protruding cells, setose, noncollapsing or collapsing upon drying. – Setae mostly 1-celled or rarely 1-septate, thick-walled, dark brown, opaque, acute to obtuse at the tips. – Pseudothecial wall leathery, formed of brown, thick-walled, polyhedral to brick-like cells. – Hamathecium consisting of cellular pseudoparaphyses. – Asci bitunicate, cylindrical-fusiform or cylindrical-clavate or clavate, thickened at the apex, short-stipitate, 8-spored. – Ascospores cylindrical-fusiform, fusiform or elongate fusiform, straight or curved, hyaline, transversely multiseptate, often one or two inner cells slightly broader, arranged in fascicles in the ascus.

Type species. – *Acanthostigma perpusillum* De Not.

Anamorphs. – *Helicosporium* C. G. Nees & F. Nees, *Helicomycetes* Link.

Habitat. – Saprobies on decaying wood and bark or mycosaprobies on stromata of other ascomycetes.

Distribution. – Cosmopolitan.

### Key to the species accepted in *Acanthostigma*

1. Ascospores with asymmetrical ends, tapering at the distal end and rounded at the proximal end, long-fusiform ..... 2
- 1\*. Ascospores with symmetrical ends, tapering and narrowly rounded or broadly rounded at both ends, long-fusiform or cylindrical-fusiform ..... 3
  
2. Ascospores 6–12-septate, (38–)48–64.5 × 4–4.5 μm, tapering and narrowly rounded at the distal end to ca. 2–2.5 μm, not curved, one or two inner cells near the proximal end slightly broader; asci (63–)84–90 × 14–15(–21) μm; setae straight, acute, opaque ..... (1) *A. ellisii*
- 2\*. Ascospores (4–)6–8-septate, (29–)38–51 × 4–4.5(–5) μm, tapering and narrowly rounded at the distal end to ca. 1.5 μm, often curved; asci 73–85(–94) × 10–15 μm; setae straight to slightly curved, obtuse at the tips, translucent brown ..... (2) *A. longisporum*



3. Ascospores usually up to 40  $\mu\text{m}$  long ..... 4
- 3\*. Ascospores usually more than 40  $\mu\text{m}$  long ..... 5
4. Ascospores (5-)6-7(-8)-septate, 30.5-35.5(-42)  $\times$  5-6  $\mu\text{m}$ , slightly constricted at the septa, narrowly rounded at the ends, one of the middle cells slightly broader ..... (3) *A. perpusillum*
- 4\*. Ascospores 5(-9)-septate, 22-27  $\times$  3-3.5  $\mu\text{m}$ , broadly rounded at the ends ..... (4) *A. revocatum*
5. Ascospores more than 3.5  $\mu\text{m}$  wide, 40-55(-63)  $\times$  (5-)6-7(-7.5)  $\mu\text{m}$ ; long-fusiform, straight or slightly curved, one of the middle cells slightly broader; *Helicomycetes* anamorph ..... (5) *A. minutum*
- 5\*. Ascospores up to 3.5  $\mu\text{m}$  wide, (40-)56-78(-95)  $\times$  (2-)2.5-3 (-3.5)  $\mu\text{m}$ ; long-fusiform to cylindrical-fusiform, often slightly curved or bent in the lower third, inner cells not broader than the others; *Helicosporium* anamorph ..... (6) *A. scopulum*

### Species accepted in *Acanthostigma*

1. *Acanthostigma ellisii* Sacc. & Syd., Syll. Fung. 14: 591, 1899. - Fig. 1.  
 = *Acanthostigma parasiticum* Ellis & Everh., Proc. Acad. Nat. Sci. Philad. 45: 443, 1893. Nom. Illeg. Art. 53.1.] *non Acanthostigma parasiticum* (R. Hartig) Sacc., Syll. Fung. 9: 855, 1891 = *Nematostoma parasiticum* (R. Hartig) M. E. Barr, Mycotaxon 64: 167, 1997.

Anamorph. - Unknown.

Teleomorph. - Pseudothecia superficial, scattered to gregarious, globose to subglobose, 150-230  $\mu\text{m}$  diam, 160-210  $\mu\text{m}$  high, brown, densely setose, noncollapsing. - Setae 0-1-septate, thick-walled, dark brown, opaque, acute, 20-85  $\mu\text{m}$  long, 4-4.5(-6)  $\mu\text{m}$  wide at the base. - Pseudothecial wall 26-37.5  $\mu\text{m}$  thick, of polyhedral, pale to mid brown, thick-walled cells, cells becoming more brick-like and paler towards interior. - Cellular pseudoparaphyses numerous among asci, branching, anastomosing, 1.5-2.5  $\mu\text{m}$  wide. - Asci bitunicate, clavate, (63-)84-90  $\times$  14-15  $\mu\text{m}$ , broadly rounded and thickened at the apex, short-stipitate, 8-spored. - Ascospores cylindrical-fusiform to long-fusiform, (38-)48-64.5  $\times$  4-4.5  $\mu\text{m}$ , straight or slightly curved, rounded at the proximal end, tapering at the distal end to ca. 2-2.5  $\mu\text{m}$ , one or two middle cells near the proximal end slightly broader than the others, 6-12-septate, nonconstricted at the septa, hyaline, 4-8-seriate in the ascus.

Specimen examined. - USA: New Jersey, Newfield, parasitic on stroma of *Diatrype stigma*, 25 Nov. 1892 (holotype of *Acanthostigma ellisii*, NY).

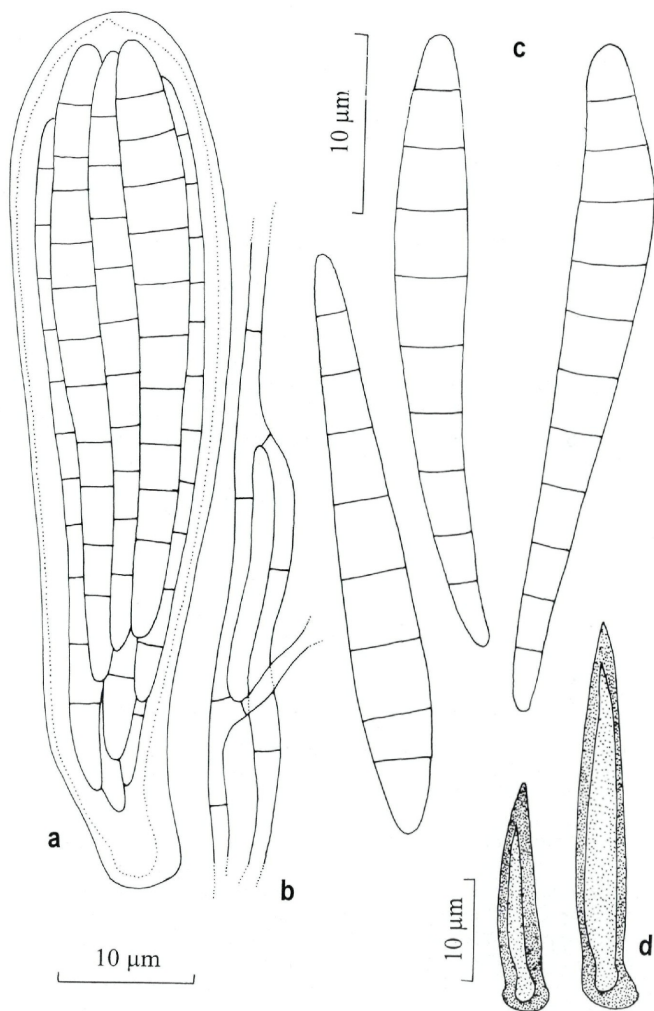


Fig. 1. *Acanthostigma ellisii* (holotype, NY). – a. Ascus containing ascospores. – b. Cellular pseudoparaphyses. – c. Ascospores. – d. Setae covering pseudothecia.

Habitat. – Mycosaprobe on stromata of other ascomycetes (*Diatrype stigma*).

Distribution. – North America: USA (New Jersey).

*Acanthostigma ellisii* seems intermediate between *A. minutum* and *A. scopulum*. However, the shape and size of ascospores clearly distinguish all three species. The two latter have ascospores with symmetrical narrowly rounded ends. Moreover, *A. minutum* has ascospores often with one of the middle cells slightly broader and pseudothecia that are covered with setae and protruding cells mostly on the upper half. *Acanthostigma scopulum* has much narrower ascospores steady wide along the whole length and typically curved or bent in the lower third.

*Acanthostigma ellisii* was introduced as a *nomen novum* for *A. parasiticum* Ellis & Everh. *non* (R. Hartig) Sacc. (Saccardo & Sydow, 1899), therefore, it is used here as the correct name.

Crane & al. (1998) cited *Acanthostigma ellisii* to be synonymous with *A. perpusillum* (as *Acanthostigmina minutum*). However, the type material of *A. ellisii* contains a fungus that is clearly different from *A. perpusillum* in having longer asci and longer ascospores with asymmetrical ends with one or two inner cells near the proximal end slightly broader. Therefore, *A. ellisii* is considered a separate species and is redescribed and illustrated based on the present re-examination of the type material.

## 2. *Acanthostigma longisporum* (Remler) Réblová & M. E. Barr, **comb. nov.** – Fig. 2.

Bas.: *Herpotrichiella longispora* Remler, *Bibl. Mycol.* 68: 94, 1979.

≡ *Acanthostigmina longispora* (Remler) J. L. Crane & al., *Can. J. Bot.* 76: 606, 1998.

= *Tubeufia alpina* L. Holm & Nograsek, *Bibl. Mycol.* 133: 221, 1990.

≡ *Acanthostigmina alpina* (L. Holm & Nograsek) J. L. Crane & al., *Can. J. Bot.* 76: 606, 1998.

Anamorph. – Unknown.

Teleomorph. – Pseudothecia erumpent to superficial, often the lower third immersed in the substratum, scattered, globose to subglobose, 150–260 µm diam, 160–250 µm high, brown, densely setose, non-collapsing. – Setae 0–1-septate, thick-walled, mid brown, straight to slightly curved, translucent in transmitted light, obtuse at the tips, 30–90 µm long, 3.5–4 µm wide in the middle. – Pseudothecial wall 15–20 µm thick, of polyhedral, pale to mid brown, thick-walled cells, cells becoming more brick-like and paler towards interior. – Cellular pseudoparaphyses numerous among asci,

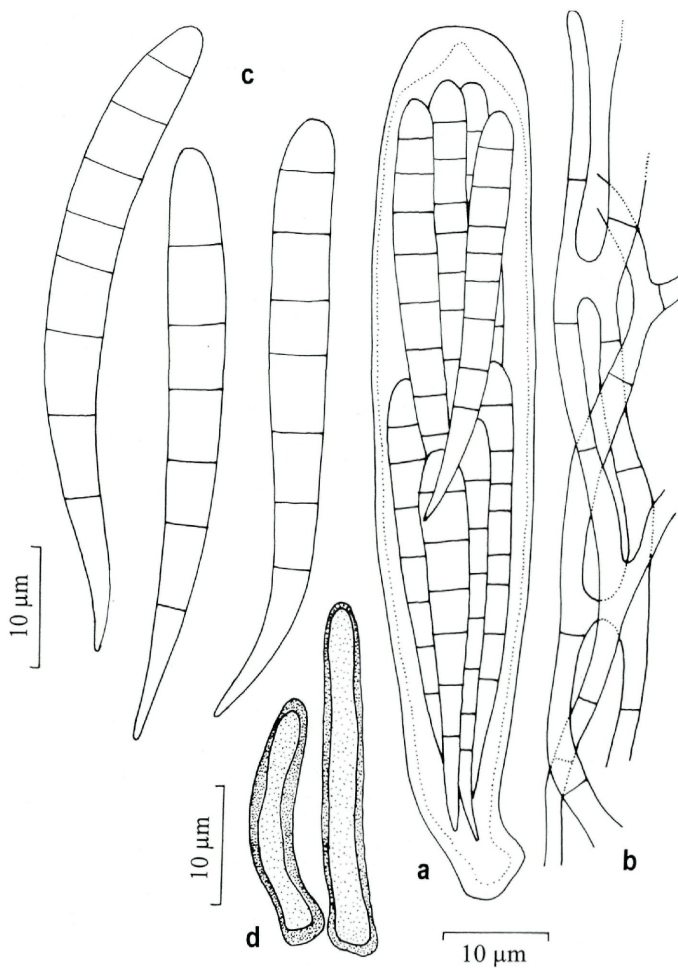


Fig. 2. *Acanthostigma longisporum* (holotype, GZU 145.80). - a. Ascus containing ascospores. - b. Cellular pseudoparaphyses. - c. Ascospores. - d. Setae covering pseudothecia.

branching, anastomosing, ca. 2.5  $\mu\text{m}$  wide. – Asci bitunicate, cylindrical-clavate, 73–85(–94)  $\times$  10–15  $\mu\text{m}$ , broadly rounded to obtuse and thickened at the apex, short-stipitate, 8-spored. – Ascospores long-fusiform, (29–)38–51  $\times$  4–4.5(–5)  $\mu\text{m}$ , straight or inequilateral, broadly rounded at the proximal end, tapering and narrowly rounded, often curved at the distal end, ca. 1.5  $\mu\text{m}$  wide, (4–)6–8-septate, non-constricted or slightly constricted at the septa, hyaline, 4-seriate in the ascus.

Specimens examined. – AUSTRIA: Carinthia [Kärnten], Alps Mts., Kreuzeck Mts. [Kreuzeck-Gruppe], between Emberger Alm and Naßfeldtörl, 2100–2200 m a.s.l., on dead branch of *Rhododendron ferrugineum*, 14 Jul. 1978, P. Remler (holotype of *Herpotrichiella longispora*, GZU 145-80). – NORWAY: Oppland, Dovre, Grimsdalen, ca. 1200 m a.s.l., on dead stem of *Dryas octopetala*, 22 Aug. 1985, L. Holm & K. Holm 3700b (holotype of *Tubeufia alpina*, UPS).

Descriptions and illustrations. – Remler (1979: 94, Tab. 2, Fig. 4); Nogršek (1990: 221, Figs. 137, 138).

Habitat. – Saprobe on woody stems or bark of dead thicker branches.

Known hosts. – *Calluna vulgaris*, *Dryas octopetala*, *Rhododendron ferrugineum*, *R. hirsutum*, *Rhodothamnus chamaecistus*, *Vaccinium myrtillus*, *Vaccinium uliginosum*.

Distribution. – Europe: Austria, Norway.

*Acanthostigma longisporum* most closely resembles *A. ellisii* in the ascospore morphology. However, the latter differs in having longer asci, dark brown opaque, acute setae and somewhat longer ascospores merely tapering, narrowly rounded and not curved at the distal end and with one or two inner cells near the proximal end somewhat broader.

The ascospores of *A. longisporum* with tapered, narrowly rounded distal end are strongly reminiscent of those of *Rebentischia* P. Karsten of the Tubeufiaceae. However, the ascospores of the latter are bicolorous, having the middle cells brown and the appendage-like end-cells hyaline.

3. *Acanthostigma perpusillum* De Not., Sfér. Ital., Cent. I, Fasc.1, 2: 85, 1863. – Fig. 3.

= *Lasiosphaeria perpusilla* (De Not.) Sacc. sensu Saccardo, Nuovo Giorn. Bot. Ital. 7: 327, 1875.

≡ *Acanthostigma revocatum* Sacc., Syll. Fung. 2: 208, 1883].

= *Sphaeria clintonii* Peck, Ann. Rep. New York State Mus. 30: 65, 1878.

≡ *Acanthostigma clintonii* (Peck) Sacc., Syll. Fung. 2: 210, 1883.

≡ *Tubeufia clintonii* (Peck) M. E. Barr, Mycotaxon 12: 163, 1980.



Anamorph. – Unknown.

Teleomorph. – *Pseudothecia* superficial, scattered, globose to subglobose, 150–155  $\mu\text{m}$  diam and 100–110  $\mu\text{m}$  high, reddish-brown to dark brown, sparsely setose on the upper part, collabent inwards when dry. – Setae 1-celled, dark brown, opaque, acute, (10–)28–97  $\mu\text{m}$  long and 5–6  $\mu\text{m}$  wide at the base. – Pseudothecial wall 15–22  $\mu\text{m}$  thick, of polyhedral, pale to mid brown, thick-walled cells arranged into 3–4 rows. – Cellular pseudoparaphyses numerous among asci, branching, anastomosing, 2–3.5  $\mu\text{m}$  wide. – Asci bitunicate, clavate, 77–79  $\times$  14–16  $\mu\text{m}$ , broadly rounded and thickened at the apex, short-stipitate, 8-spored. – Ascospores fusiform, narrowly rounded at both ends, one of middle cells often broader than the others, 30.5–35.5(–42)  $\times$  5–6  $\mu\text{m}$ , (5–)6–7(–8)-septate, straight or slightly curved, non-constricted or slightly constricted at the septa, hyaline, 2–4-seriate in the ascus.

Specimens examined. – FRANCE: Noidan, Côte d'Or, on decayed wood of *Quercus* sp., Feb. 1899, F. Fautrey (PAD). – ITALY: Lombardia, Turbigo, on inner side of bark of *Cerasus* sp. (associated with *Calosphaeria pulchella*), Gené (holotype of *Acanthostigma perpusillum*, RO). – USA: New York, Buffalo, Erie Co. (Alden in protologue), on decaying wood, Nov. 1876, G. W. Clinton (holotype of *Sphaeria clintonii*, NYS).

Descriptions and illustrations. – De Notaris (1863: 85, Tab. 95); Peck (1878: 65, Plate 2, Figs. 19–23); Berlese (1894: 103, Tab. 100, Fig. 3); Barr (1980: 163, Figs. 16–18).

Habitat. – Saprobe on decayed wood of deciduous trees.

Known hosts. – *Cerasus* sp., *Elletaria* sp., *Quercus* sp.

Distribution. – Europe: Austria, Italy, Switzerland, France; North America: USA (Louisiana, Massachusetts, New Hampshire and New York); Canada (Ontario and Quebec); South America: Grenada, Venezuela; Asia: Java.

*Acanthostigma perpusillum* is characterized by minute, setose, collapsing pseudothecia and hyaline, (5–)6–7(–8)-septate, fusiform ascospores narrowly rounded at both ends, usually with one of the middle cells somewhat broader. The species is well documented by Barr (1980) as *Tubeufia clintonii* (Peck) M. E. Barr. Upon the revision of the type material of *Sphaeria clintonii* and other herbarium material, Barr (1980) described the ascospores as (2–)5–7(–11)-septate and somewhat longer [(19–)32–45(–54)  $\times$  (2.5–)3.5–5.5(–6)  $\mu\text{m}$ ] than those in the type material of *A. perpusillum*. In all other respects the type of *A. perpusillum* and material of taxa referred by Barr (1980) to *T. clintonii* are identical. As was indicated in the key of species in *Acanthostigma*, the species concept of *A. perpusillum* should be re-

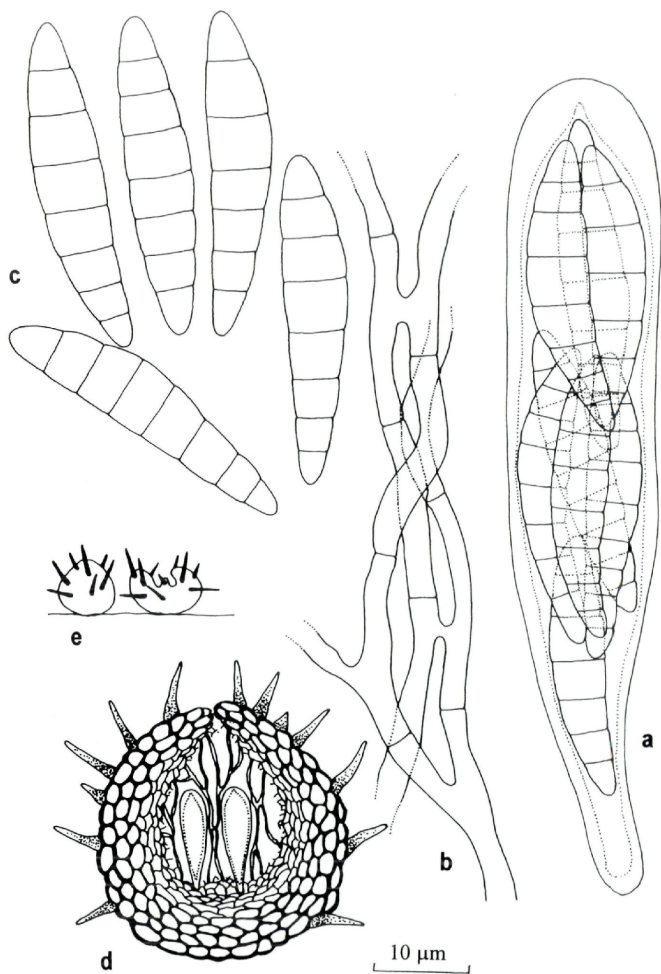


Fig. 3. *Acanthostigma perpusillum* (holotype, RO). – a. Ascus containing ascospores. – b. Cellular pseudoparaphyses. – c. Ascospores. – d. Habit sketch, median longitudinal section of pseudothecium. – e. Habit sketch of pseudothecia on the natural substratum.

stricted to taxa with ascospore length up to 40 µm. Those taxa with longer ascospores should be compared with *A. minutum* (see below).

*Acanthostigma perpusillum* is related to *A. revocatum* that differs in having smaller asci and smaller ascospores that are broadly rounded at each end. *Acanthostigma minutum* resembles *A. perpusillum* generally in the shape of ascospores but differs in having the ascospores always longer than 40 µm and broader, usually 6–7 µm wide.

De Notaris primarily marked the type collection of *A. perpusillum* (RO) as *Sphaeria stictica*, an unpublished herbarium name. Later, when De Notaris (1863) described a new genus *Acanthostigma* with a new species *A. perpusillum* he based the descriptions on this material that he renamed and chose as a type. In the protologue De Notaris (1863) cited *Sphaeria eres* Berk. & C. Broome [= *Venturia eres* (Berk. & C. Broome) Ces. & De Not.; Cesati & De Notaris, 1863], *Sphaeria dickiei* Berk. & C. Broome [= *Metacoleroa dickiei* (Berk. & C. Broome) Petr.; Petrak, 1927] and *Sphaeria chaetomium* Corda [= *Niesslia exilis* (Alb. & Schw. : Fr) G. Winter; G. Winter, 1887] to have an affinity with *A. perpusillum*.

Barr (1993) cited two herbarium specimens to represent *A. perpusillum* in North America. The first collection bearing the unpublished name *Acanthostigma atrobarbum* (Cooke & Ellis) Ellis Everh. var. *piniolum* (CANADA: Ontario, Ottawa, on rotten pine wood, 23 Jul. 1897, NY 428) represents a species of *Chaetosphaeria*, known as *Chaetosphaeria crustacea* (Sacc.) Réblová & W. Gams (Réblová & Gams, 1999); the *Chloridium-Cylindrotrichum* anamorph is abundantly present. The other collection bearing the name *Sphaeria barbirostris* Dufour (USA: New Jersey, Vineland, on inner surface of cast off bark of *Acer saccharum*, J. B. Ellis, N.A.F. 186) preserved in NY did not contain any pseudothecia of *A. perpusillum*.

4. *Acanthostigma revocatum* Sacc., Syll. Fung. 2: 208, 1883. – Fig. 4.

[= *Lasiosphaeria perpusilla* (De Not.) Sacc. sensu Saccardo, Nuovo Giorn. Bot. Ital. 7: 327, 1875. Fungi Ital. autograph. del., Fasc. 1–4, t. 141, 1877.]  
non *Acanthostigma perpusillum* De Not., Sfér. Ital., Cent. I, Fasc. 1, 2: 85, 1863.

= *Acanthostigma minutum* (Fuckel) Sacc. var. *brachysporum* Sacc., Syll. Fung. 2: 209, 1883.

Anamorph. – Unknown.

Teleomorph. – Pseudothecia superficial, gregarious, globose, 120–150 µm diam, 120–140 µm high, dark brown, densely setose, non-collapsing. – Setae 1-celled, thick-walled, dark brown,

opaque, acute, 15–20  $\mu\text{m}$  long, 2.5–3.5  $\mu\text{m}$  wide at the base. – Pseudothecial wall 27–30  $\mu\text{m}$  thick, of polyhedral, mid brown, thick-walled cells. – Cellular pseudoparaphyses numerous among asci, branching, anastomosing, ca. 2.5  $\mu\text{m}$  wide. Asci bitunicate, cylindrical-clavate, 40–50  $\times$  13–15  $\mu\text{m}$ , broadly rounded and thickened at the apex, short-stipitate, 8-spored. – Ascospores cylindrical to fusiform, 22–27  $\times$  3–3.5  $\mu\text{m}$ , straight or slightly curved, broadly rounded at both ends, 5(–9)-septate, nonconstricted at septa, hyaline, 4-seriate in the ascus.

Specimen examined. – ITALY: Selva, Treviso, on decayed wood of *Salix vitellina*, 1873, P. A. Saccardo (holotype of *Acanthostigma revocatum*, PAD).

Descriptions and illustrations. – Saccardo (1883: 208); Berlese (1894: 104, Tab. 101, Fig. 3; Tab. 102, Fig. 1); Podlahová (1974: 180, Fig. 61).

Habitat. – On decayed decorticated wood of deciduous trees.

Known hosts. – *Quercus* sp., *Salix vitellina*.

Distribution. – Europe: Italy.

*Acanthostigma revocatum* is characterized by short, 22–27  $\mu\text{m}$  long, cylindrical to fusiform ascospores with broadly rounded ends. It resembles *A. perpusillum* in ascospores and overall habitat of pseudothecia but the latter differs in that the ascospores are longer, usually up to 40  $\mu\text{m}$  long, tapering at both ends, usually containing more septa, slightly constricted at the septa and with one of the middle cells often slightly broader.

Saccardo (1883) distinguished *A. minutum* var. *brachysporum* from the type variety (as *A. perpusillum* in the present study) in having smaller ascospores (25–32  $\times$  4–4.5  $\mu\text{m}$ ). Berlese (1894) examined the type material of var. *brachysporum* and illustrated the ascospores as 8–9-septate and fusiform with broadly rounded ends. Upon the present search in PAD neither the type material of the variety nor any other herbarium material could be found. The *A. minutum* var. *brachysporum* apparently represents a counterpart of *A. perpusillum* having smaller-sized ascospores. Judging from the protologue it matches well the circumscription of *A. revocatum* (Saccardo, 1883). Therefore, *A. minutum* var. *brachysporum* is relegated to synonymy.

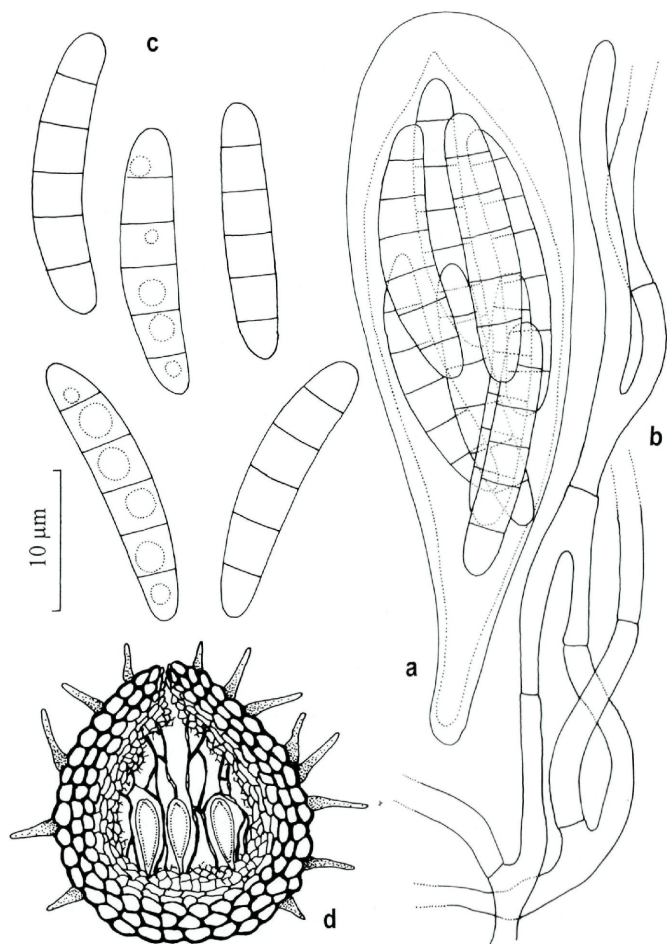


Fig. 4. *Acanthostigma revocatum* (holotype, PAD). – a. Ascus containing ascospores. – b. Cellular pseudoparaphyses. – c. Ascospores. – d. Habit sketch, median longitudinal section of pseudothecium.



5. *Acanthostigma minutum* (Fuckel) Sacc., Syll. Fung. 2: 209, 1883. – Figs. 5,6.  
= *Lasiosphaeria minuta* Fuckel, Jahrb. Nassau. Ver. Naturk. 23–24: 148, 1870.  
= *Acanthostigmia minuta* (Fuckel) Höhn., Sitzungsber. Kaiserl. Akad. Wiss. Math.–Naturwiss. Cl., Abt. 1, 118: 1499, 1909.  
= *Acanthostigma nectrioideum* Penzig & Sacc., Malpighia 11: 530, 1897.  
= *Acanthostigma scleracanthum* (Sacc.) Sacc., Syll. Fung. 2: 209, 1883.  
= *Lasiosphaeria scleracantha* Sacc., Michelia 1: 46, 1878.  
= *Tubeufia setosa* A. Sivan. & W.H. Hsieh, Mycol. Res. 99: 928, 1995.

Anamorph. – *Helicomyces* sp. (described here).

Teleomorph. – Pseudothecia superficial, scattered to gregarious, globose to subglobose, 120–230  $\mu\text{m}$  diam, 150–250  $\mu\text{m}$  high, brown, densely setose mostly on the upper half, covered with dark brown, opaque protruding cells, non-collapsing. – Setae 1-celled or rarely 1-septate, thick-walled, dark brown, opaque, acute, 28–100  $\mu\text{m}$  long, 4.5–5  $\mu\text{m}$  wide in the middle, 7–8  $\mu\text{m}$  wide at the bulbous base. – Pseudothecial wall 26–37  $\mu\text{m}$  thick, of polyhedral, mid brown, thick-walled cells. – Cellular pseudoparaphyses numerous among asci, branching, anastomosing, ca. 1.5–2.5  $\mu\text{m}$  wide. – Asci bitunicate, cylindrical-clavate, 75–95(–126)  $\times$  18–23  $\mu\text{m}$ , broadly rounded and thickened at the apex, short-stipitate, 8-spored. – Ascospores long-fusiform, tapering at both ends and narrowly rounded, straight or slightly curved, one of the middle cells slightly broader, 40–55(–63)  $\times$  (5–)6–7(–7.5)  $\mu\text{m}$ , 10–14-septate, non-constricted or slightly constricted at the septa, hyaline, (4–5)–8-seriate in the ascus.

Anamorph on the natural substratum (Fig. 6). – Colony effuse, yellowish to pale brown. – Mycelium subhyaline to pale brown; hyphae septate, branching, 5.5–6.5  $\mu\text{m}$  wide. – Setae absent. – Conidiophores erect, simply branched, septate, pale brown, up to 55  $\mu\text{m}$  long, 5.5–6.5  $\mu\text{m}$  wide in the middle, bearing sparse minute denticles. – Conidia holoblastic on denticles, hyaline, multiseptate, coiled in two planes, ca. 3.5  $\mu\text{m}$  wide, the diameter of the coil 19–21  $\mu\text{m}$ .

Specimens examined. – FRANCE: Noidan, Côte d'Or, on decaying wood of *Populus* sp., Feb. 1899, F. Fautrey (neotype of *Acanthostigma scleracanthum*, PAD; designated here). – SWITZERLAND: Jura, on decayed wood of *Quercus* sp., Morthier (holotype of *A. minutum*, G). – CANADA: British Columbia, Sidney, on *Gaultheria shallon*, 21 Jul. 1995, M. E. Barr 9033 (DAOM). – TAIWAN: Anmashan, Taichung Hsien, on decaying wood (associated with *Helicomyces* sp.), A. Sivanesan 71 (holotype of *Tubeufia setosa*, IMI 354620, as IMI 354621 in protologue). – USA: Connecticut, 1 mi south of Canaan, on decayed wood (associated with *Hemitrichia clavata*), 2 Nov. 1959, C. T. Rogerson (as *Acanthostigma decastylum*, NY).

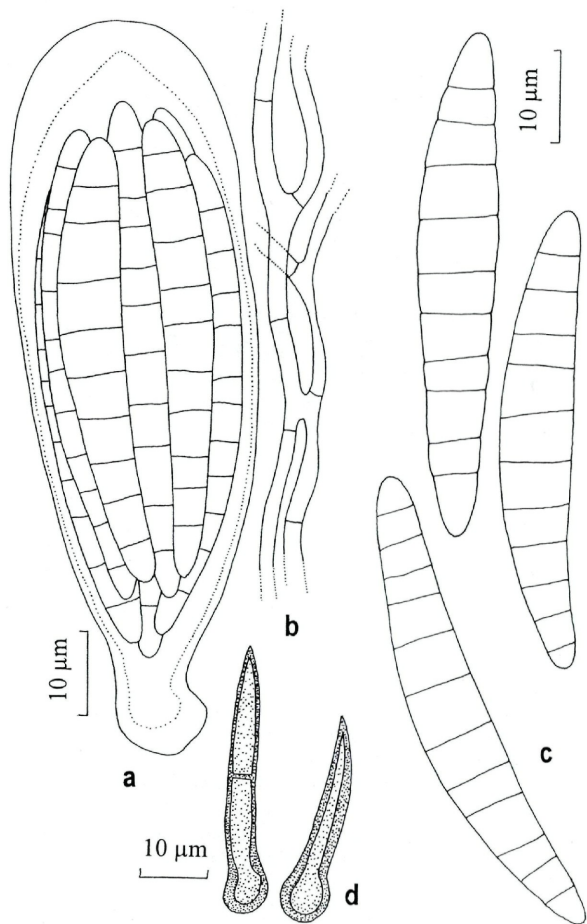


Fig. 5. *Acanthostigma minutum* (*A. scleracanthum*, neotype PAD). - a. Ascus containing ascospores. - b. Cellular pseudoparaphyses. - c. Ascospores. - d. Setae covering pseudothecia.

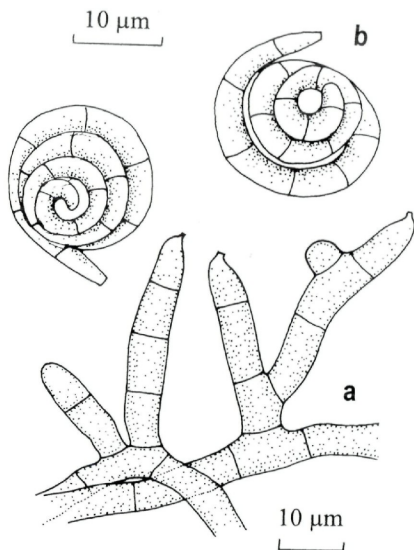


Fig. 6. *Acanthostigma minutum*, *Helicomyces* sp. anamorph (IMI 354620). – a. Conidiophores and mycelium. – b. Conidia. From nature.

Exsiccatae. – Rehm: Ascomyceten (No. 1568. GERMANY: Alps Mts., ca. 1200 m a.s.l., on decayed wood of branch of *Fagus sylvatica*, Jun. 1904, H. Rehm, as *Acanthostigma minutum*, PAD).

Descriptions and illustrations. – Saccardo (1878: 46); Hsieh & al. (1995: 928, Figs. 40–43); Teng (1996: 70, Fig. 100a).

Habitat. – Saprobe on decaying wood of deciduous trees and woody, dicotyledonous shrubs.

Known hosts. – *Fagus sylvatica*, *Gaultheria shallon*, *Populus* sp., *Quercus* sp.

Distribution. – Europe: France, Germany, Switzerland; North America: Canada (British Columbia), USA (Connecticut); Asia: China, Taiwan.

*Acanthostigma minutum* is characterized by minute pseudothecia that are setose and covered with protruding cells mostly on the upper half and long-fusiform, 7–10(–13)-septate ascospores with symmetrical narrowly rounded ends. It is related to *A. ellisii* that differs in having 6–12-septate narrower ascospores with asymme-

trical ends; *A. scopulum* that possesses 10–14-septate, longer and narrower ascospores and *A. perpusillum* that has ascospores of similar shape but shorter and narrower.

The type material of *A. scleracanthum* (ITALY: Consiglio, on decayed wood of *Fagus sylvatica*, Oct. 1875, P. A. Saccardo, PAD) is apparently lost (present search in PAD). Podlahová (1974) examined the type material of *A. scleracanthum* and provided detailed description and illustration that are in full agreement with our observation.

Another specimen identified by Saccardo as *A. scleracanthum* was collected by F. Fautrey in 1899 in France and was preserved in PAD. This material matches well the circumscription of *A. scleracanthum* given by Saccardo (1878) and Podlahová (1974) on the basis of the holotype. The material collected by F. Fautrey is designated here as a neotype.

Upon the examination of the type material, *Tubeufia setosa* (as sect. *Acanthostigmina*; Hsieh & al., 1995) is relegated to synonymy. Although Hsieh & al. (1995) did not report any associated anamorph, effuse yellowish to pale brown colonies of *Helicomycetes* sp. were observed around pseudothecia on the natural substratum. The conidiophores and mycelium that were found growing from the perithecia initials and mature perithecia as well as from the surface of the substratum are described and illustrated here.

6. *Acanthostigma scopulum* (Cooke & Peck) Peck, Bull. New York State Mus. 1: 22, 1887. – Fig. 7.

- ≡ *Sphaeria scopula* Cooke & Peck, Ann. Rep. New York State Mus. 32: 51, 1880.
- ≡ *Lasiosphaeria scopula* (Cooke & Peck) Sacc., Syll. Fung. 9: 852, 1891.
- ≡ *Tubeufia scopula* (Cooke & Peck) M. E. Barr, Mycotaxon 12: 164, 1980.

Anamorph. – *Helicosporium aureum* (Corda) Linder, Ann. Missouri Bot. Gard. 16: 279, 1929.

Teleomorph. – Pseudothecia superficial, scattered to gregarious, globose to subglobose to conical, 165–310 µm diam, 180–300 µm high, brown to vinaceous brown, densely setose, non-collapsing. – Setae 1-celled, thick-walled, dark brown, opaque, acute, 37–90 µm long, 4.5–5 µm wide in the middle, 6–7.5 µm wide at the base. – Pseudothecial wall 25–35 µm thick, of polyhedral, mid brown, thick-walled cells. – Cellular pseudoparaphyses numerous among asci, branching, anastomosing, ca. 1.5–2.5 µm wide. – Asci bitunicate, cylindrical-clavate, (67–)86–110(–130) × 12–15 (–22) µm, broadly rounded and thickened at the apex, short-stipitate, 8-spored. – Ascospores long-fusiform to cylindrical-fusiform,

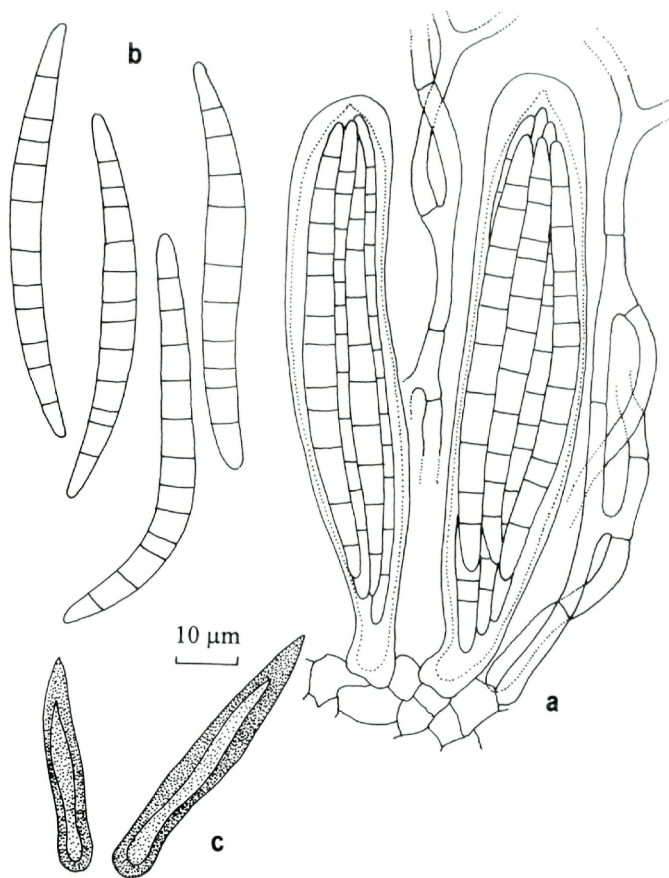


Fig. 7. *Acanthostigma scopulum* (holotype, NYS). – a. Asci with ascospores and cellular pseudoparaphyses. – b. Ascospores. – c. Setae covering pseudothecia.

(40–)56–78(–95) × (2–)2.5–3(–3.5) µm, tapering and narrowly rounded at both ends, often bent or slightly curved in the lower third, 10–14-septate, non-constricted at the septa, hyaline, 5–8-seriate in the ascus.



Specimens examined. – AUSTRIA: Wiener Wald, decaying wood, 21 May 1903, F. Höhnelt (FH). – USA: New York, Adirondack Mts., on wood of *Tsuga* sp., Aug. 1878, C. H. Peck (holotype of *Sphaeria scopula*, NYS); New Jersey, Newfield, Sep. 1878, J. B. Ellis (FH); New Jersey, Newfield, Oct. 1880, J. B. Ellis (NY); Florida, Grasmere, 30 Mar. 1893, W. C. Sturgis (FH, NY); Alabama, Tuskegee, 26 Aug. 1901, G. W. Carver (FH).

Exsiccatae. – J. B. Ellis: North American Fungi [No. 184. USA: Louisiana, on decaying wood of *Pinus* sp. (associated with *Helicosporium aureum*), as *Sphaeria scopula*, NY].

Descriptions and illustrations. – Berlese (1894: 103, Tab. 101, Fig. 1); Barr (1980: 164, Figs. 19–21).

Habitat. – Saprobe on decayed decorticated wood of conifers, rarely on wood of deciduous trees.

Known hosts. – *Fagus sylvatica*, *Pinus* sp., *Tsuga* sp.

Distribution. – Europe: Austria; North America: USA (Alabama, Florida, New Jersey, and New York).

*Acanthostigma scopulum* is characterized by 10–14-septate, long-fusiform to cylindrical-fusiform ascospores that are often bent or slightly curved in the lower third, tapering and narrowly rounded at both ends and a strong preference for decayed wood of coniferous trees, but occasionally it can grow on wood of deciduous trees. It is mostly known from North America although one collection was made in Central Europe. *Acanthostigma scopulum* can be compared with *A. minutum* that differs in having somewhat shorter and broader and only slightly curved ascospores. *Acanthostigma ellisii* resembles *A. scopulum* in long-fusiform to cylindrical-fusiform ascospores and number of septa, however, the former clearly differs in that the ascospores have asymmetrical ends with one or two inner cells near the proximal end slightly broader.

### Excluded species

*Acanthostigma filisporum* M. E. Barr, Mycotaxon 46: 63, 1993. – Fig. 8.

Anamorph. – Unknown.

Teleomorph. – Perithecia superficial, scattered, reddish-brown to brown, subglobose to globose, 120–210  $\mu\text{m}$  diam, setose, collapsing deeply inwards upon drying. – Setae 4–6-septate, tapering, dark brown, opaque, 67–84  $\mu\text{m}$  long, 6–7  $\mu\text{m}$  wide at the base. – Perithecial wall 22–30  $\mu\text{m}$  thick, of thick-walled polyhedral cells; cells becoming thinner-walled, more flattened and paler towards the interior. – Hamathecium consisting of remnants of apical paraphyses seen as chains of saccate cells among asci, ca. 4–

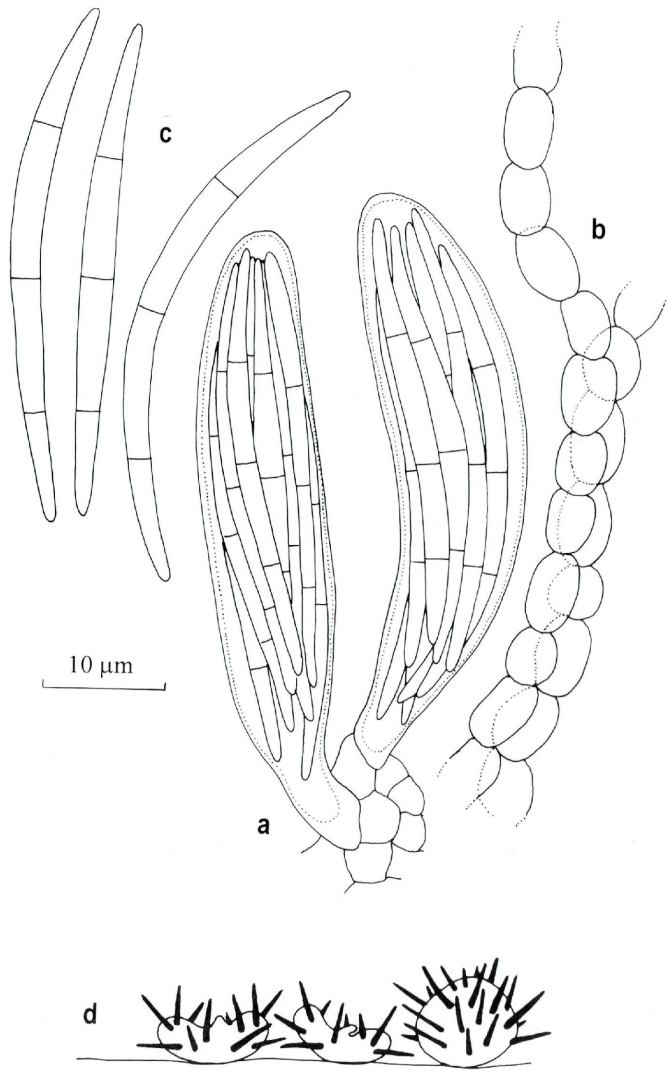
5 µm wide. – Asci unitunicate, cylindrical-clavate, 40.5–72 × 7–9 µm, apex thin-walled, without any visible discharge mechanism, short-stipitate, 8-spored. – Ascospores long-fusiform, 33–47 × 1.5–2 µm, straight or curved, tapering at both ends, 3-septate, non-constricted at the septa, hyaline, in fascicle in the ascus.

Specimen examined. – USA: Massachusetts, Franklin Co., Conway, Baptist Hill, on a dead branch of *Fraxinus americanus* showing canker symptoms, 16 Dec. 1979, M. E. Barr 6648 (NY).

Barr (1990, 1993, 1997) interpreted *Acanthostigma* as a perithecial ascomycete genus having unitunicate asci and placed it in the Trichosphaeriaceae. In accordance with this generic concept, Barr (1993: 63, Fig. 2x, y) described a new species *A. filisporum*. The type material of *A. filisporum* could not be located in NY. The other collection (M. E. Barr 6648, NY) designated by Barr (1993) was examined.

In regard to minute, setose and deeply collapsing perithecia, unitunicate asci, apical paraphyses and hyaline ascospores *A. filisporum* resembles taxa of the Niessliaceae. The apical paraphyses that were seen among maturing asci in the material of *A. filisporum* (M. E. Barr 6648, NY) are identical to those described for *Valetoniellopsis* Samuels & M. E. Barr having *Acremonium*-like anamorph (Samuels & Barr, 1997: 2175, Fig. 41) and *Cryptoniesslia* Scheuer (Scheuer 1993a: 544, Fig. 3) of the Niessliaceae. Within the family *A. filisporum* also resembles *Valetoniella claviornata* Samuels & M. E. Barr in elongate fusiform ascospores and their arrangement in fascicles in the asci. *Valetoniella* Höhn. differs in having the perithecia ornamented with dark setae with apically forked and coronate apices and the typical habitat over or near other ascomycetous fungi. In the Niessliaceae features of the perithecial vestiture were considered to have a diagnostic value in separating genera (Samuels & Barr, 1997). In this light, it is difficult to place *A. filisporum* in any genus of the family. It shares features of ascospores with *Valetoniella* and features of dark, stiff, pointed setae with *Trichosphaerella* E. Bommer, M. Rousseau & Sacc. (ascospores ellipsoidal, 1-septate, disarticulating into part-spores; setae very short; *acremonium*-like anamorph), *Niesslia* Auersw. (ascospores ellipsoidal to fusiform, 1-septate, nonfragmenting; setae very short; *Monocillium* anamorph) and *Cryptoniesslia* (perithecia immersed with setae usually in-

Fig. 8. *Acanthostigma filisporum* (M. E. Barr 6648, NY). – a. Asci containing ascospores. – b. Apical paraphyses formed of chains broadly inflated cells occurring among maturing asci. – c. Ascospores. – d. Habit sketch of perithecia on the natural substratum.



tegrated in the upper half of the perithecium, setae short to elongate; ascospores ellipsoidal-fusiform, 1-septate, nonfragmenting; anamorph unknown; on monocotyledonous substrates). Of these taxa, *Niesslia* would seem to be the most appropriate taxon to accommodate *A. filisporum*. We do not accept *A. filisporum* as a species of *Acanthostigma*, however, we hesitate to accept it in *Niesslia* without cultural studies and examining type and other material.

*Acanthostigma filisporum* is also remarkably similar to *Zignoëlla slaptonensis* P. F. Cannon (Cannon, 1997) in regard to narrow and long-fusiform, hyaline 1–3-septate ascospores arranged in a fascicle in the ascus, thin-walled asci without any visible discharge mechanism and occurrence on wood of a branch showing a canker symptom [Specimen examined. – United Kingdom: England, Devon, Kingsbridge, Slapton Ley, Marsh Lane, on a dead branch of *Ulmus* sp. showing a canker symptom, 6 May 1994, P. F. Cannon, IMI 362466 (holotype)]. However, the ascomata of *Z. slaptonensis* are partly immersed, glabrous and hamathecium consists of filiform, at the septa not constricted, ca. 1.5–3 µm thick interthecial filaments observed among asci. Cannon (1997) discussed a possible relationship of *Z. slaptonensis* with *Chaetosphaeria* or *Ceratosphaeria* Niessl.

### Discussion

According to Barr (1980) the Tubeufiaceae accommodated ten mycoparasitic or saprobic or mycosaprobic genera including *Tubeufia* that was divided into four sections (sect. *Tubeufia*, *Thaxteriella*, *Nectrioidea* and *Acanthostigmina*). The Tubeufiaceae *sensu* Rossman (1987) accommodated sixteen genera; the generic concept and infra-generic classification of *Tubeufia* suggested by Barr (1980) was fully adopted. According to the recent compilation of the saprobic Tubeufiaceae by Crane & al. (1998) the family encompassed ten saprobic or mycosaprobic genera including *Acanthostigmina*, *Thaxteriella* and *Tubeufia* (sect. *Nectrioidea* and *Tubeufia*) as separate genera.

*Acanthostigma*, including *Acanthostigmina* as its generic synonym, is a distinct genus in the Tubeufiaceae. In *Acanthostigma*, shape and size of ascospores, size of asci and morphology of setae can be exclusively used as outstanding features distinguishing taxa at the species level. The conidiogenesis has been observed merely in two species, *A. minutum* (anamorph *Helicomyces*) and *A. scopulum* (anamorph *Helicosporium*); in both the conidia are helicosporous. Although the complete life history of other species remains unknown, the conidia and conidiophore morphology might serve as an associate diagnostic character at the species level. The basic differences between *Acanthostigma* and *Tubeufia* lie in features of as-

comata. They are vinaceous, reddish-brown, brown or dark brown, covered with dark brownish-black, often opaque, acute or obtuse setae in *Acanthostigma*. *Tubeufia* is characterized by ascomata that are hyaline, white, yellowish to pinkish or becoming darkened at maturity and, on drying, smooth or covered with protruding cells or thick-walled hyphal appendages or short dark setae.

Von Arx & Müller (1975) suggested *Nematostoma* to accommodate *Acanthostigma*. Although the two genera show certain superficial similarity in ascomata and ascospores they clearly differ in biology and anamorphs. *Nematostoma* and the Pseudoperisporiaceae are superficial biotrophs on leaf surfaces and trichomes (Rossmann, 1987; Sivanesan, 1987). Where anamorphs are suspected or known, they are small pycnidia, similar to the ascomata (Barr, 1997). *Acanthostigma* and all members of the Tubeufiaceae include superficial saprobes usually on woody substrates or hypersaprobes on other fungi or on substrates previously colonized by other fungi or hyperparasites on foliicolous fungi or saprobes on old culms and leaves of Cyperaceae and Poaceae. Known anamorphs are dematiaceous hyphomycetes with usually helicosporous, staurosporous, phragmosporous or occasionally dictyosporous conidia (Linder, 1929; Hughes, 1958; 1978; Samuels & al., 1979; Scheuer, 1991).

Within the Tubeufiaceae, *Acanthostigma* can be compared with *Acanthophiobolus* (Barr, 1997; Crane & al., 1998) and *Taphrophila* (Scheuer, 1988; 1991). All three genera share minute, dark, setose ascomata, bitunicate cylindrical-clavate asci, narrow cellular pseudoparaphyses and hyaline, cylindrical-fusiform or fusiform or elongate fusiform or scolecosporous ascospores. *Helicosporium* and *Helicomycetes* anamorphs have been linked to *Acanthostigma*. A *Mirandina* anamorph has been linked to *Taphrophila cornu-capreoli* Scheuer the life history of which was also confirmed by cultural studies (Scheuer, 1991). *Acanthophiobolus* has not been yet linked to any anamorph (Walker, 1980). *Acanthophiobolus* is characterized by minute, superficial, globose, dark brown, setose ascomata, hyaline scolecosporous ascospores tightly coiled in a dense spiral in the ascus and a strong preference for herbaceous substrates or rarely growing on textiles of plant origin. *Taphrophila* was established for taxa with minute, pale brown, non-collapsing pseudothecia covered with dichotomously branched setae, pseudoparaphyses, bitunicate asci and fusiform, septate, hyaline ascospores (Scheuer, 1988). Crane & al. (1998) separated *Taphrophila* from *Acanthostigma* (as *Acanthostigmina*) on the basis of the nature of dark brown setae; setae that branch dichotomously before tapering to pointed apices in the former and setae that taper without branching to an apical point in the latter. In addition, *Taphrophila* can be also separated from



*Acanthostigma* by its occurrence and fructification on decaying culms and leaves of Cyperaceae and Poaceae.

Although Scheuer (1988; 1991) considered dichotomously branched setae a diagnostic generic character within the Tubeufiaceae, *Tubeufia trichella* (Sacc., E. Bommer & M. Rousseau) Scheuer, a species that was otherwise habitually and biologically similar to *Taphrophila*, was described with acute setae that were more irregularly or dichotomously branched in some collections or remain unbranched (including lectotype; Scheuer, 1993b). The ontogeny of ascomatal setae might indicate that taxa with either acute and unbranched setae or branched setae could be placed in one genus. On the other hand features of the perithecial vestiture served as a diagnostic character in separating genera, for instance, in the Niessliaceae (Samuels & Barr, 1997). On the basis of acute and unbranched setae Scheuer (1991) separated from *Taphrophila* another species, *Tubeufia hebridensis* Dennis with otherwise similar morphology and biology. Later, Crane & al. (1998) accepted the two graminicolous *Tubeufia* species in *Acanthostigmina*. Although the type species *Acanthostigmina minuta* was relegated to synonymy with *Acanthostigma* in the present paper and the majority of its species were accepted in the latter genus, we hesitate to accept *Acanthostigmina trichella* (Sacc., E. Bommer & M. Rousseau) J.L. Crane & al. and *A. hebridensis* (Dennis) J. L. Crane & al. We prefer to preserve *Acanthostigma* for species that are saprobes on decaying woody substrata or mycosaprobes on old ascomata or stromata of other fungi. The related *Taphrophila* should be retained for species with minute, light to dark brown pigmented pseudothecia covered with more irregularly or dichotomously branched or unbranched setae; bitunicate asci containing eight fusiform to elongate fusiform to cylindrical, hyaline, multiseptate ascospores sometimes coiled in the ascus; holoblastic conidiogenesis on small denticles and phragmoporous conidia, i.e. the *Mirandina* anamorph and occurrence on monocotyledonous substrates.

Two other species *Tubeufia setosa* A. Sivan. & W. H. Hsieh (Hsieh & al., 1995) and *T. miscanthi* W. H. Hsieh, C. Y. Chen & A. Sivan. (Hsieh & al., 1998) were described in *Tubeufia* sect. *Acanthostigmina*. The comments on or their re-disposition are missing in the survey of the saprobic Tubeufiaceae compiled by Crane & al. (1998). Upon the present revision of the type material, the former species is attributed to *Acanthostigma* and relegated to synonymy with *A. minutum*. The latter shares biology and morphology of setae (300–400 µm long and 6–10 µm wide) with *Acanthophiobolus* and biology and morphology of elongate fusiform ascospores arranged in a fascicle with *Taphrophila*.

Although the generic delimitation of *Acanthostigma* and *Taphrophila* is very narrow, mainly based on habitat (lignicolous or herbicolous) and life history (anamorphs are mostly known for type species only), we assume that the affinity of *Tubeufia hebridensis*, *T. miscanthi* and *T. trichella* lie with *Taphrophila* rather than with *Acanthostigma* or *Acanthophiobolus* or the restricted *Tubeufia* in the Tubeufiaceae. The anamorph of *Tubeufia hebridensis* and *T. miscanthi* are unknown (Dennis, 1980; Hsieh & al., 1998) and the cultivation of *T. trichella* yielded a sterile mycelium in pure culture (Scheuer, 1991).

Therefore, we propose three new combinations:

***Taphrophila hebridensis*** (Dennis) Réblová & M. E. Barr, **comb. nov.**

(Bas.: *Tubeufia hebridensis* Dennis, Mycol. Res. 95: 814, 1991)

***Taphrophila miscanthi*** (W. H. Hsieh, C. Y. Chen & A. Sivan.) Réblová & M. E. Barr, **comb. nov.**

(Bas.: *Tubeufia miscanthi* W.H. Hsieh, C.Y. Chen & A. Sivan., Mycol. Res. 102: 234, 1998)

***Taphrophila trichella*** (Sacc., E. Bommer & M. Rousseau) Réblová & M. E. Barr, **comb. nov.**

(Bas.: *Ophiobolus trichellus* Sacc., E. Bommer & M. Rousseau, Bull. Soc. Roy. Bot. Belg. 29: 259, 1890)

### Acknowledgments

We acknowledge the loan of the type and other herbarium material from herbaria cited in the text. The project was supported in part by the Grant Agency of the Czech Republic, projects GAČR 206/99/D082 and GAČR 206/99/1416.

### References

- Arx, J. A. von & E. Müller (1975). A re-evaluation of the bitunicate Ascomycetes with keys to families and genera. – Stud. Mycol. 9: 1–159.
- Barr, M. E. (1968). The Venturiaceae in North America. – Can. J. Bot. 46: 799–864.
- (1977). *Acanthostigmella* (Herpotrichiellaceae). – Mycotaxon 7: 17–23.
- (1980). On the family Tubeufiaceae (Pleosporales). – Mycotaxon 12: 137–167.
- (1990). Prodromus to nonlichenized, pyrenomycetous members of class Hymenozascomycetes. – Mycotaxon 39: 43–184.
- (1993). Redisposition of some taxa described by J. B. Ellis. – Mycotaxon 46: 45–76.
- (1997). Notes on some 'dimeriaceous' fungi. – Mycotaxon 64: 149–171.
- Berlese, A.N. (1894). Icones fungorum omnium hucusque cognitorum. Vol. 1. – Biblioth. Mycol. 16A: 1–243. (Reprint 1968)

- Cannon, P. F. (1997). Two new genera of Ascomycota, and other new or interesting fungi from Slapton Ley National Nature Reserve and its environs. – Syst. Ascomyc. 15: 121–138.
- Cesati, V. & G. De Notaris (1863). Schema di classificazione degli Sferiacei italici più o meno appartenenti al genere *Sphaeria* nell'antico significato attribuitogli da Persoon. – Comment. Soc. Crittogamol. Ital. 1: 177–240.
- Crane, J. L., C. A. Shearer & M. E. Barr (1998). A revision of *Boerlagiomyces* with notes and a key to the saprobic genera of Tubeufiaceae. – Can. J. Bot. 76: 602–612.
- Dennis, R. W. G. (1980). Microfungi of St. Kilda. – Kew Bull. 34: 741–744.
- De Notaris, G. (1863). Sferiacei Italici. Centuria I. Fasc. 2–3. – Genova, 90 pp., 120 pl.
- Ellis, J. B. & B. M. Everhart (1892). North American Pyrenomycetes. – Newfield, 793 pp.
- Eriksson, O. E. & D. L. Hawksworth (1998). Outline of the Ascomycetes – 1998. – Syst. Ascomyc. 16: 83–296.
- Fuckel, L. 1870. Symbolae Mycologicae. Jahrb. – Nassau. Ver. Naturk. 23–24: 1–459.
- Höhnelt, F. von (1909). Fragmente zur Mykologie IX. Mitteilung, Nr. 436. Über *Acanthostigma nectrioideum*. – Sitzungsber. Kaiserl. Akad. Wiss., Math.-Naturwiss. Cl., Abt. 1, 118: 1498–1499.
- Hsieh, W. H., C. Y. Chen & A. Sivanesan (1995). Taiwan fungi: new species and new records of ascomycetes. – Mycol. Res. 99: 917–931.
- , — & — (1998). Six new ascomycetes from Taiwan. – Mycol. Res. 102: 228–234.
- Hughes, S.J. (1958). Revisiones hyphomycetum aliquot cum appendice de nominibus rejiciendis. – Can. J. Bot. 36: 727–836.
- (1978). New Zealand fungi 25. Miscellaneous species. – New Zealand J. Bot. 16: 311–370.
- Linder, D.H. (1929). A monograph of the helicosporous Fungi Imperfecti. – Ann. Missouri Bot. Gard. 16: 227–388.
- Müller, E. (1965). Beobachtungen an Ascomyceten. – Sydowia 18: 86–105.
- Mussat, E. (1901). Synonymia generum, specierum subspecierumque in Vol. 1–14 descriptorum. – Sylloge Fungorum omnium hucusque cognitorum digessit P. A. Saccardo Vol. 15. Paris, 455 pp.
- Nograské, A. (1990). Ascomyceten auf Gefäßpflanzen der Polsterseggenrasen in den Ostalpen. – Bibl. Mycol. 133: 1–271.
- Peck C. H. (1878): Report of the Botanist. – Ann. Rep. New York State Mus. Nat. Hist. 30: 23–78.
- Petrak, F. (1927). Mykologische Notizen 9. Nos. 502–600. – Ann. Mykol. 25: 193–343.
- Podlahová, R. 1974. Lignicolous members of the Lasiosphaeriaceae (Fuckel) Nannf. I, II. – [PhD thesis; dep. in: Fac. Nat. Sci., Charles University, Prague], in Czech, Ms., Prague, 320 pp.
- Rébllová, M. & W. Gams (1999). Teleomorph-anamorph connections in Ascomycetes 1. *Cylindrotrichum* and *Cacumisporium* anamorphs of *Chaetosphaeria*. – Czech Mycol. 51: 1–40.
- Remler, P. (1979). Ascomyceten auf Ericaceen in den Ostalpen. – Bibl. Mycol. 68: 1–321.
- Rossmann, A. Y. (1987). The Tubeufiaceae and similar Loculoascomycetes. – Mycol. Pap. 157: 1–71.
- Saccardo, P. A. (1878). Fungi Veneti novi vel critici vel Mycologiae Venetae addendi. Series VI. – Michelia 1: 1–72.
- (1883). Pyrenomycetae. – Sylloge Fungorum hucusque cognitorum Vol. 2. Padova, 813 pp.

- (1891). Supplementum universale. Pars I. – Sylloge Fungorum hucusque cognitorum Vol. 9. Padova, 1141 pp.
- (1895). Supplementum universale. Pars III. – Sylloge Fungorum hucusque cognitorum Vol. 11. Padova, 753 pp.
- & P. Sydow (1899). Supplementum universale. Pars IV. – Sylloge Fungorum hucusque cognitorum Vol. 14. Padova, 1316 pp.
- & J. B. Traverso (1910). Index iconum fungorum enumerans eorundum figuras omnes hucusque editas ab auctoribus sive antiquis sive recentioribus. – Sylloge Fungorum hucusque cognitorum Vol. 19. Padova, 1158 pp.
- & A. Trotter (1913). Supplementum universale. Pars IX. Ascomycetae-Deuteromycetae. – Sylloge Fungorum hucusque cognitorum Vol. 22. Padova, 1612 pp.
- Samuels, G. J. & M. E. Barr (1997). Notes on and additions to the Niessliaceae (Hypocreales). – Can. J. Bot. 75: 2165–2176.
- , A. Y. Rossman & E. Müller (1979). Life-history studies of Brazilian Ascomycetes 2. A new species of *Thaxteriella* and its helicosporous anamorph. – Sydowia 31: 137–141.
- Scheuer, C. (1988). Ascomyceten auf Cyperaceen und Juncaceen im Ostalpenraum. – Bibl. Mycol. 123: 1–274.
- (1991). *Taphrophila* (Dothideales: Tubeufiaceae) and two species of *Tubeufia* with dark setae. – Mycol. Res. 95: 811–816.
- (1993a). *Cryptoniesslia setulosa* gen. et sp. nov. – Mycol. Res. 97: 543–546.
- (1993b). Lectotypification of *Ophiobolus trichellus* (Dothideales, Ascomycetes). – Mycotaxon 47: 67–69.
- Sivanesan, A. (1987). Studies on the genera *Dimeriellopsis*, *Hyalomeliolina* and *Nematostoma*. – Syst. Ascomyc. 6: 201–212.
- Teng, S. C. (1996). Fungi of China. – Ithaca, 586 pp.
- Trotter, A. (1926). Supplementum universale. Pars X. Phycomycetae, Laboulbeniomycetae, Pyrenomycetae pp. – Sylloge Fungorum hucusque cognitorum Vol. 24. Avellino, 1438 pp.
- Walker, J. (1972). Type studies on *Gaeumannomyces graminis* and related fungi. – Trans. Br. Mycol. Soc. 58: 427–457.
- (1980). *Gaeumannomyces*, *Linocarpon*, *Ophiobolus* and several other genera of scolecospored ascomycetes and *Phialophora* conidial state, with a note on hyphopodia. – Mycotaxon 11: 1–129.
- Winter, G. (1887). Die Pilze, Ascomyceten: Gymnoasceen und Pyrenomyceten. In: Rabenhorsts Kryptogamen-Flora Deutschl., Öster. und der Schweiz, 2<sup>nd</sup> Ed., Band 2, 1(2) – Leipzig, 928 pp.

(Manuscript accepted 28<sup>th</sup> June 2000)

# ZOBODAT - [www.zobodat.at](http://www.zobodat.at)

Zoologisch-Botanische Datenbank/Zoological-Botanical Database

Digitale Literatur/Digital Literature

Zeitschrift/Journal: [Sydowia](#)

Jahr/Year: 2000

Band/Volume: [52](#)

Autor(en)/Author(s): Reblova Martina, Barr Margaret E.

Artikel/Article: [The genus Acanthostigma \(Tubeufiaceae, Pleosporales\).  
258-285](#)