

A REVISION OF *TRICHOPEZIZA LIZONII*, *T. SULPHUREA* AND *T. VIOLASCENS* (ASCOMYCOTA, HELOTIALES) FROM THE HERBARIUM PRM WITH NOTES ON TYPE MATERIAL OF *PEZIZA SULPHUREA*

MARKÉTA CHLEBICKÁ

Mycological Department, National Museum, Václavské náměstí 68, 115 79, Praha 1, the Czech Republic;
e-mail: marketa_chlebicka@nm.cz



Chlebická, M. (2013): A revision of *Trichopeziza lizonii*, *T. sulphurea* and *T. violascens* (Ascomycota, Helotiales) from the herbarium PRM with notes on type material of *Peziza sulphurea*. – Acta Mus. Nat. Pragae, Ser. B, Hist. Nat., 69 (1–2): 93–100. Praha. ISSN 0036-5343 • DOI 10.14446/AMNP.2013.093

Abstract. Material deposited mostly under *Dasyscyphus sulphureus* in the herbarium PRM is revised. The species with a reaction to KOH are briefly described. Generic delimitation of the genus *Trichopeziza* is discussed. The *Peziza sulphurea* type material is revised. The species is lectotypified and epitypified.

■ *Trichopeziza*, Europe, the Czech Republic, taxonomy, typification.

Received May 31, 2013

Issued September, 2013

Introduction

The genus *Trichopeziza* Fuckel (Ascomycota, Helotiales) is a Lachnaceae genus characterised by sessile apothecia with a pale disc and white, yellow or brown, non-bristle-like hairs. The hairs are long, multiseptate and warty (always with scattered warts, sometimes larger crystals are also present along the hair). The excipulum is composed of *textura angularis* (ectal excipulum) and *textura intricata* (medullary excipulum), sometimes a layer of subhymenium, distinct from the medullary excipulum, is developed. Paraphyses are lanceolate. The genus includes species occurring on wood and on dead stems of herbs. It differs from *Lasiobelonium* ELLIS et EVERH. in the character of the excipulum. The generic delimitation was discussed by Raitviir (1980) and Spooner (1987) and critical remarks are published in this paper.

This article is focused on *Trichopeziza* species growing on herbs. There are 2 types of species, those in which the hairs do not exhibit a violet reaction when mounted in KOH and those in which the hairs do produce a violet reaction. The taxonomy of the former species still require thorough study, the latter species are discussed in the present paper.

Raitviir (1970) and Svrček (1988) described a red-violet or violet reaction of hairs when placed in KOH in some species of the genus: *Trichopeziza violascens* (RAITV.) RAITV. and *T. subsulphurea* (SVRČEK) BARAL. A deep violet reaction of excipular cells and hairs in KOH is known in *Trichopeziza sulphurea* (PERS.) FÜCKEL (Dennis 1949). Nylander (sec. Rehm 1893) and Rehm (1893), who observed the reaction earlier, used 'Aetzammoniak'. Baral (in Weber 1992: 104) noted a further reaction in this group of fungi – his '*Trichopeziza* cf. *mollissima* 4' material

discoloured in KOH due to a pigment which originates from a purpureous brown exudate on the hairs.

There was a lot of confusion connected with the name *Trichopeziza sulphurea* (PERS.) FÜCKEL (*Peziza sulphurea* PERS., *Lachnum sulphureum* (PERS.) P. KARST.). It was used for a species currently known as *Trichopeziza sulphurea* by Nylander (1869 sec. Dennis 1962), Saccardo (1889), Dennis (1949), Raitviir (1970) and it is also used for this species at present (e.g. Ellis et Ellis 1985, Vesterholt 2000). However, Rehm (1893) used the name for a species currently known as *Trichopeziza violascens*. This concept was followed by Svrček (1979). In 1962, a revision of *T. sulphurea* type material was carried out by Dennis (Dennis 1962), but it did not result in lectotypification. He only stated that the specimens surviving in Persoon's herbarium under the name *Peziza sulphurea* were not in good enough condition to conclusively settle the question.

The aim of this article is to revise the material deposited mostly under *Dasyscyphus sulphureus* (PERS.) MASSEE in the herbarium PRM and to identify and discuss the species found there. A further topic is the revision and typification of *P. sulphurea* which is necessary for clarification of the taxonomy and nomenclature of this group of *Trichopeziza* species.

Methods

Material from the herbarium specimens was rehydrated using tap water, prepared and studied on slides in 3% KOH using a stereomicroscope (Olympus SZ-61) and a light microscope (Olympus BX-51). A purple-red or purple reaction to KOH was also carried out using a 3% solution. This concentration proved to be sufficient for the reaction.

During the study of specimens from Persoon's herbarium, 4% KOH was used. The number of measurements recorded per species is presented in Table 1. Colour identification follows the Colour identification chart according to the Flora of British fungi (Anonymus 1969). Colours according to Saccardo (1912) are given in square brackets. Numbers in the form 'L 910,256-897' or 'Herb. Lugd. Bat. 910,256-897' are specimen numbers in Persoon's collection in herbarium L (Nationaal Herbarium Nederland, Leiden University Branch, Leiden). Most of the specimens used for this study are deposited in the herbarium PRM (National Museum, Prague, the Czech Republic). Herbarium acronyms are cited in accordance with Thiers (2013).

Results

Trichopeziza lizonii (SVRČEK) BARAL et E. WEBER,

Bibliotheca Mycol. 140: 105, 1992.

Text-figs 1A-B, 2

Basionym: *Belonidium lizonii* SVRČEK, Česká Mykol. 42: 139, 1988.

Description: Dried apothecia 0.5–2.0 mm in diam., disc luteous (51), hairs bay (19) to purplish chestnut (21). Hairs discolouring dilute purple-red or dilute purple in 3% KOH. Hairs 45–100 µm long, 3.1–4.6 µm wide, 3.0–4.5 µm in the upper part, 4-9-septate, with scattered warts, plasma colourless, dilute vinaceous buff or dilute bay. Asci 56–68 × 4.5–6.3 µm, arising from croziers. Ascospores 12–16.5 × 1.8–2.6 µm, non-septate, containing c. up to 10 small or medium sized lipid bodies. Paraphyses lanceolate, 2.6–3.1(–4.9) µm wide, exceeding the asci by 7.5–12.7 µm.

Specimens studied: the Czech Republic: Western Bohemia, Hradišťany near Stod, on *Astragalus glycyphyllos*, 14 October 1949, leg. M. Svrček, PRM 690309, as *Lachnum sulphureum*. – Slovakia: Western Slovakia, Malé Karpaty Mts., Bratislava, in a private garden, on *Artemisia vulgaris*, June 1987, leg. P. Lizoň, PRM 758484 (holotype), as *Belonidium lizonii*.

Comments: The hairs are short and the reaction to 3% KOH is also thus less strong. The colour of the reaction is identical with *T. sulphurea* and *T. violascens*. During the reaction with KOH brown particles (hair exudate) diffuse into the KOH.

Trichopeziza sulphurea (PERS.) FÜCKEL,

Jb. Nassau. Ver. Naturk. 23-24: 296, 1870 [1869-70].

Text-figs 1C-D, 3

Basionym: *Peziza sulphurea* PERS., Tent. Disp. Meth. Fung., p. 33, 1797.

= *Erinella nylanderii* Rehm, Ascomyceten in Rabenhorst's Krypt.-Fl. Deutschl., Oest. und Schweiz, 1/3: 910, 1893.

Description: Dried apothecia 0.5–1.2 mm in diam., disc saffron (49), orange (48) to apricot (47), hairs bay (19) to fuscous black (36); 'discs' without hymenium whitish to beige. Hairs discolouring purple-red in 3% KOH. Hairs 109–193 µm long, 3.3–4.1 µm wide, 2.9–3.6 µm in the upper part, 10-18-septate, with scattered warts, lower parts vinaceous, plasma colourless or dilute vinaceous buff. Asci 83–96 × 5.8–8.4 µm, arising from simple septa. Ascospores 21–35 × 2.2–2.9 µm, 0-3(-4)-septate, filled with

lipid bodies. Paraphyses lanceolate, 3.1–4.8(-5.6) µm wide, exceeding the asci by 12–21.5 µm.

Specimens studied: Germany: Saxony, bei Göda, on *Urtica dioica*, 16 February 1899, leg. G. Feurich, PRM 674385, as *Erinella nylanderii*. – the Czech Republic: Northern Bohemia, České Středohoří Mts., Bukový vrch hill near Milešov, on *Urtica dioica*, 23 September 1954, leg. M. Svrček, PRM 771581, as *E. nylanderii*. – Western Bohemia, Diana virgin forest near Rozvadov, on *Urtica dioica*, 15 September 1964, leg. F. Kotlaba, V. Jechová et Z. Pouzar, PRM 672828, as *Dasyscyphus sulphureus*. – Central Bohemia, Černošice, on *Cirsium oleraceum*, 3 September 1964, leg. M. Svrček, PRM 611885, as *D. sulphureus*. – Southern Bohemia, Čimelice, Alnetum, on *Urtica dioica*, 19 August 1964, leg. M. Svrček, PRM 613294, as *D. sulphureus*. – Southern Bohemia, Varvažov near Čimelice, 'U Mostu', in alluvium of Skalice river, on *Urtica dioica*, 15 August 1977, leg. M. Svrček, PRM 819827, as *D. sulphureus*. – Southern Bohemia, Rakovické chalupy chalets near Mirovice, on *Urtica dioica*, 30 July 1969, leg. M. Svrček, PRM 684682, as *D. sulphureus*. – Southern Bohemia, Alnetum at Lužnice between Bechyně and Dobronice u Bechyně, on *Urtica dioica*, 18 September 1962, leg. V. Skalický, PRM 668207, as *D. sulphureus*. – Austria: Lower Austria, Sonntagberg Mt. near Rosenau, on *Urtica dioica*, July, leg. P. P. Strasser, Kryptogamae exsiccatae, no. 2031, PRM 6905, as *E. nylanderii*.

Comments: The ascospores of *T. sulphurea* contain numerous lipid bodies. The same content can also be visible in young asci where ascospores are still not clearly separated. This feature distinguishes the species from *T. violascens*. The reaction to KOH, which has identical development in almost all old collections of *T. sulphurea* and *T. violascens*, is as follows: the hairs become blood red [dark purple, vinous] at first, then the purple-red [purple] colour begins to diffuse into the solution and when we chip in the solution e.g. using a blade, we can see a flow of purpureous brown particles which originate from the hairs.

Trichopeziza violascens (RAITV.) RAITV.,

Eesti NSV Tead. Akad. Toim., Biol. seer 36: 318, 1987.

Text-figs 1E-H, 4

Basionym: *Belonidium violascens* RAITV., Scripta Mycol. 1: 46, 1970.

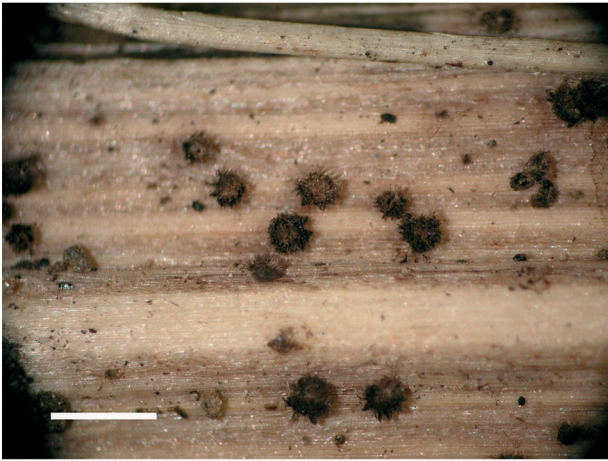
= *Trichopeziza sulphurea* (PERS.) FÜCKEL ss. Rehm, Ascomyceten in Rabenhorst's Krypt.-Fl. Deutschl., Oest. und Schweiz, 1/3: 891, 1893 teste Svrček (1979).

Description: Dried apothecia 0.5–2.3 mm in diam., disc cream-coloured (3C), dilute buff (between 4D and 52) to apricot (47), hairs cinnamon (10), bay (19) to fuscous black (36). Hairs discolouring purple-red in 3% KOH. Hairs 105–250 µm long, 3.2–4.2 µm wide, 2.7–3.6 µm in the upper part, 9-19-septate, with scattered warts, plasma dilute purple with dilute cigar brown pigment. Asci 53–65 × 4.3–5.6(-6.7) µm, arising from croziers. Ascospores (7.5-)9.5–15(-22) × 1.7–2(-2.3) µm, non-septate, rarely 1-septate, with a few (0–4) small lipid bodies. Paraphyses lanceolate, 3–4.6 µm wide, exceeding the asci by 12–24 µm.

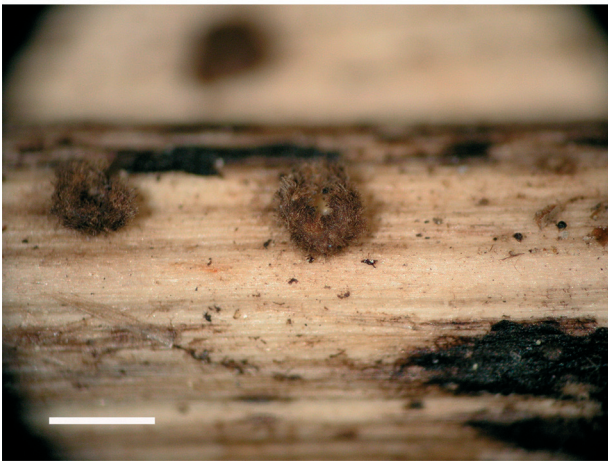
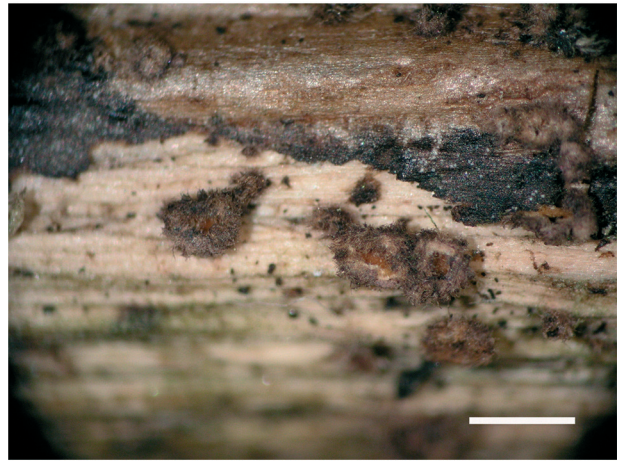
Specimens studied: the Czech Republic: Western Bohemia, Karlovy Vary, on a herb with alternate leaves, 3 June 1959, leg. O. Dvořák, PRM 668206, as *Dasyscyphus sulphureus*. – Western Bohemia, Mariánské Lázně, on a railway, on *Heracleum sphondylium*, 15 May 2008, leg. M. Chlebická, PRM



A B



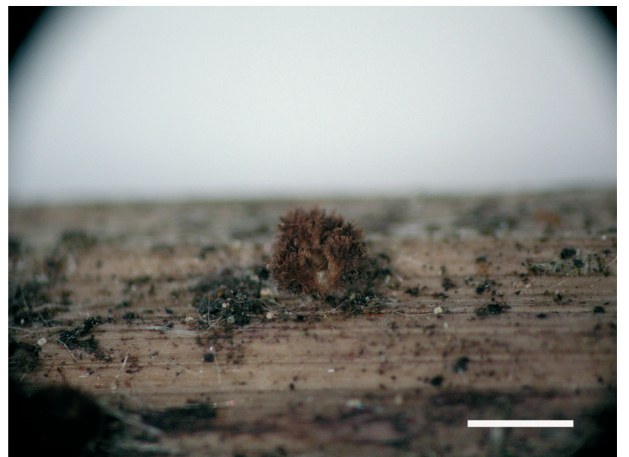
C D



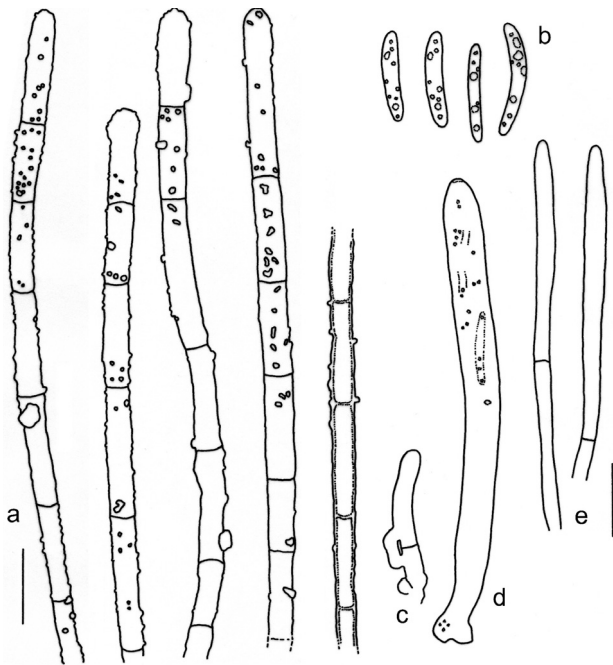
E F



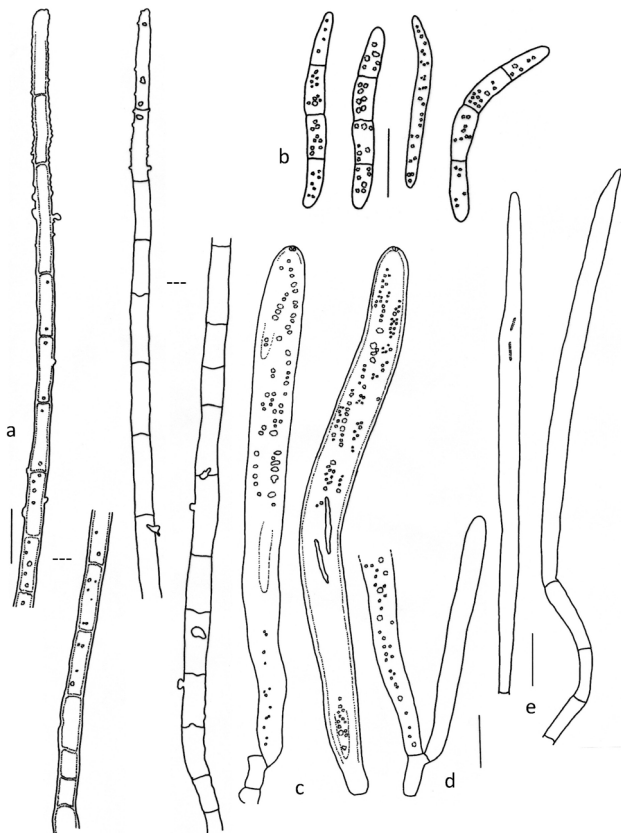
G H



Text-fig. 1. Apothecia in dried state. A-B. *Trichopeziza lizonii* (PRM 758484, holotype); C-D. *Trichopeziza sulphurea* (C. PRM 611885; D. PRM 672828, epitype); E-H. *Trichopeziza violascens* (E. PRM 622536; F. PRM 668773; G-H. 915197). Scale bars = 1 mm.



Text-fig. 2. *Trichopeziza lizonii* (PRM 758484, holotype). a. hairs; b. ascospores; c. young ascus with crozier; d. ascus; e. paraphyses. Scale bars: a, b-e = 10 µm.

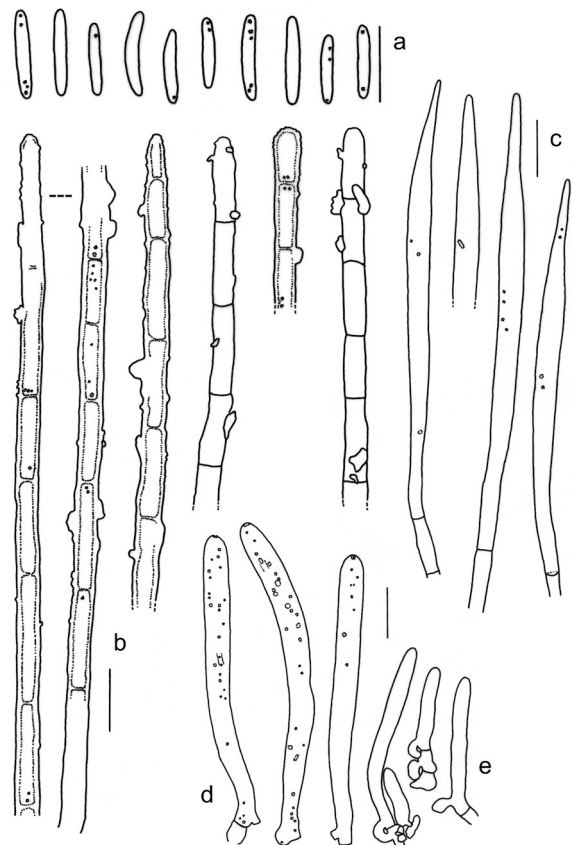


Text-fig. 3. *Trichopeziza sulphurea* (PRM 672828, epitype). a. hairs; b. ascospores; c. asci; d. asci arising from simple septa; e. paraphyses. Scale bars: a, b, c-d, e = 10 µm.

915197, as *T. violascens*. – Eastern Bohemia, Českomoravská vrchovina hills, Svojanov, on herbaceous stems, 21 June 1949, leg. J. Kubička, PRM 668773, as *D. sulphureus*. – Southern Bohemia, Lutová, on a hill near Chlum u Třeboně, on *Astragalus glycyphyllos*, 15 May 1966, leg. M. Svřek, PRM 622536, as *D. sulphureus*. – Northern Moravia, Šternberk, on *Sambucus ebulus*, May 1926, leg. J. Piskoř, F. Petrak, Mycotheca generalis

no. 575, PRM 690340, as *Lachnum sulphureum*. – Northern Moravia, Podhoří near Hranice, on *Actaea spicata*, 18 June 1922, leg. F. Petrak, Fl. Boh. et Mor. exs. no. 1610, PRM 7750, as *L. sulphureum*.

C o m m e n t s : Apothecia of *T. violascens* are bigger than those of *T. sulphurea* and have a rather brown colour in the dried state. However, specimens with blackish brown apothecia unrecognisable from those of *T. sulphurea* were also often observed in the herbarium. The reaction to KOH was found to be the same in both species. Thus, the only reliable identification is according to the asci and ascospores. In most of collections, *T. violascens* has germinating ascospores, thus giving them the appearance of being long. They contain however, only a few small lipid bodies, and are up to 15(-18) µm long, and only rarely with one septum. Asci of *T. violascens* are up to 65 µm long and arise from croziers. Asci of *T. sulphurea* measure 80–95 µm and arise from simple septa. *Trichopeziza lizonii* differs from *T. violascens* only by its shorter hairs (45–100 µm long) and slightly bigger and somewhat more abundant lipid bodies in the ascospores, otherwise it is very close to *T. violascens*.



Text-fig. 4. *Trichopeziza violascens* (PRM 915197). a. ascospores; b. hairs; c. paraphyses; d. asci; e. young asci with croziers. Scale bars: a, b, c, d-e = 10 µm.

Discussion

Fructification period. A field search for spring *Trichopeziza* species on herbs was carried out by the author in the Czech Republic in 2009 (16 localities in Western, Central, Eastern and Southern Bohemia) – in the period from May (first finds) to the beginning of July (last finds usable for study).

Table 1. Number of measurements. The cells of the table contain number of specimens, number of apothecia and number of measurements, all separated by semicolons.

	<i>T. lizonii</i>	<i>T. sulphurea</i>	<i>T. violascens</i>
diameter of apothecia	1;28	2;7	3;36
length of hairs	2;2;14	4;5;11	4;6;10
width of hairs	2;2;12	4;4;9	4;5;8
width of paraphyses	2;2;8	3;4;10	3;3;11
exceeding the asci	2;2;4	3;4;11	3;3;9
length of asci	2;2;14	7;8;12	6;9;27
width of asci	2;2;14	7;8;13	6;9;26
ascospores	2;2;6	6;7;13	6;9;35

No specimen of *T. sulphurea* was found during this search. Therefore, it was concluded that *T. sulphurea* does not occur in the period from May to the beginning of July in this area. This result agrees with Ellis et Ellis (1985) who revised specimens from August to October, it does not agree with the results of Breitenbach et Kränzlin (1984) who suggested April to October to be the fructification period, but it agrees with the revised specimens from the herbarium PRM. Spring collections of *T. sulphurea* exist in herbaria, but they require revision, because, based on experience from PRM, they mostly contain *Trichopeziza violascens* material. On the other hand, there is also spring collection of *T. sulphurea* from the Netherlands, Ankeveen, found on *Urtica dioica*, 5 April 1957, leg. J. Daams, herb. L (Luijt-Verheij 1973) confirmed by my revision. A record by Dennis (1949) from Richmond, Britain, on *Arctium*, 23 May 1947, leg. W.G. Bramley, requires revision.

Differences between the genera *Trichopeziza* and *Lasiobelonium*. Many lignicolous species of *Lasiobelonium* were described by Raitviir (1980) or thoroughly delineated by Spooner (1987) and Baral (2005). There is distinct variability in their excipulum structure. As follows from the generic description by Spooner (1987), the ‘two-layered excipulum’ is typical for the genus *Lasiobelonium* (type species *L. subflavidum* ELLIS et EVERH.) and the species with duplex medullary excipulum (‘three-layered excipulum’) are possibly worth a separation to the genus *Trichopeziza* based on this one difference. Spooner (1987) presumed that *Lasiobelonium* and *Trichopeziza* do not differ in structure of the ectal excipulum. As mentioned by Spooner (1987), cells are mostly arranged in rows at a high angle to the surface on the flanks of the receptacle in *L. subflavidum*. Baral (2005: HB 7875) illustrated the excipulum for *L. variegatum* (FUCKEL) RAITV. The described character is developed more distinctly in *Lasiobelonium loniceræ* (ALB. et SCHWEIN.) RAITV. (Baral 2005). In species of *Trichopeziza* growing on herbs which I studied, the ectal excipulum is usually not so thin and the row structure is lost in the textura angularis or t. angulari-globulosa. In contrast, interwoven hyphae of medullary excipulum are parallel to the surface or at a little angle. Consequently, both the ‘two-layered’ and ‘three-layered’ excipulum are present among the herbicolous *Trichopeziza* species. When Spooner (1987) accepted *Trichopeziza* as a separate genus and transferred *Belonidium*

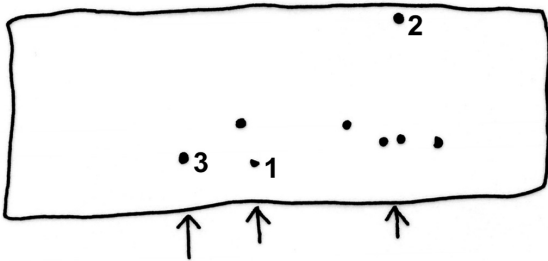
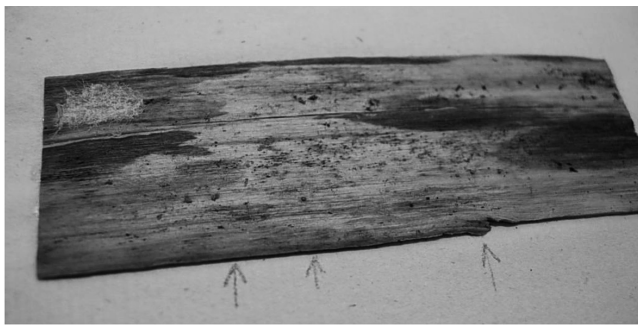
leucophaeum (PERS.) RAITV., the (lecto-)type species of *Trichopeziza*, into it, he based his decision on Raitviir (1980), who considered an excipulum with the third compact layer below the hymenium as typical for *Belonidium leucophaeum*. For the purpose of generic delimitation this character should be abandoned. Instead, it is considered here as important that the species of *Lasiobelonium* are (sessile-) subsessile to short-stalked and have a thin excipulum of the above described character. Only few sequences of *Trichopeziza* and *Lasiobelonium* are available at present (Hosoya et al. 2010).

Type study of *Peziza sulphurea* PERS., Tent. Disp. Meth. Fung., p. 33, 1797.

Peziza sulphurea was originally described very briefly from stalks of herbs, and sulphur colour of hairs is mentioned in the protologue. In Persoon’s collection in herbarium L, there is one specimen labelled as *Peziza sulphurea* (L (Herb. Lugd. Bat.) 910,261-594) with unclear datation, one specimen labelled as a variety of *P. sulphurea* (L 910,256-897) with unclear datation, and three specimens which were obviously collected later. They may be mostly dated to the Paris period of Persoon’s life. One was collected by Desmazières, another one was from a location near Paris and the label of the last one includes a reference to Syn. Meth. Fung. from 1801 (L 910,261-22, 910,256-900 and 910,261-591). Details are given below:

L 910,261-594 (labelled as ‘*Peziza sulphurea*’; syntype of *P. sulphurea*; Text-figs 5, 7A-B): the specimen contains six apothecia and two fragments of apothecia. The studied piece from one of the parts does not contain a hymenium and the hymenium of another apothecium is young, containing only septate hyphae with slightly subacute tips (future paraphyses). Even an apothecium which looks more developed does not contain asci, but in one place primordia were seen which indicate that asci are arising from croziers. Paraphyses are lanceolate, 3.1–4.0 µm wide, mostly subacute, therefore not rounded as is usual in young hymenium, but also not so sharp. The excipulum is massive, due to the young apothecium and consists of an ectal part with cells (measured in water c. 40–47 µm thick), part with interwoven hyphae (c. 37 µm thick) and subhymenium (c. 14 µm thick). The specimen represents a species with croziers and ‘three-layered excipulum’. There is some hesitation about its reaction in KOH, because no colour or particles were apparent in a drop of KOH, but the plasma of the hairs was dilute brown with a vinaceous tint. Its identification is therefore unclear (?*T. violascens*, ?an undescribed *Trichopeziza* species or a population which dissolves in KOH with brown particles originating from the hairs only). Apothecia of *T. leucophaea* (Pers.) Rehm ss. Raitviir (1980) have the ‘three-layered excipulum’ and asci arising from croziers, but the hairs do not produce a vinaceous tint in KOH. Raitviir’s concept of *T. leucophaea* is different from the modern concept of *T. leucophaea* (e.g. Vesterholt 2000), which seems to correspond more to a species with ‘two-layered excipulum’ and asci arising from simple septa.

L 910,256-897 (labelled as ‘*Peziza sulphurea* var.’; syntype of *P. sulphurea*; Text-figs 6, 7C-D): the specimen contains apothecia of *Trichopeziza violascens* or *T. sulphurea*, which are too young for clear identification, and apothecia of a second species having asci arising from croziers, ascospores 8–12 × 1.7–2.2 µm, young paraphyses 2.7–2.9 µm wide, c. 9 µm exceeding the asci, hairs with yellow, later yellow to beige shine in a drop of KOH. The substrate is a herb from the Apiaceae: *Anthriscus* (less probably *Heracleum*). According to the above discussed period of fructification, the specimen represents material from summer containing young apothecia of *T. sulphurea* and mature apothecia of *Trichopeziza* sp.



Text-fig. 5. Original material of *Peziza sulphurea* (syntype L 910,261-594), the substrate and schema with location of six apothecia and two fragments of apothecia. Apothecia marked with numbers 1–3 were examined microscopically.

L 910,261-22 (labelled as '*Peziza sulphurea*? Myc. Eur. p. 250 ... sur l'heracleum sphond...' by Desmazières): the specimen contains apothecia with an unclear reaction of the hairs to KOH. A weak beige colour in KOH was observed only in the immediate vicinity of the hairs. The hairs being 134–163 μm long, 6-12-septate, very pale brown from plasmatic pigments, asci 55–64 \times 4.1–5.6 μm , arising from croziers, paraphyses 2.7–3.7 μm wide, exceeding the asci by 11–17 μm , ascospores of variable length, 10–15.5 \times 1.8–2 μm , some of them containing small droplets. Its identification is the same as under L 910,261-594. The substrate is *Heracleum sphondylium*. The specimen was collected by Desmazières. As Desmazières started his mycological activity around 1825, the specimen cannot be considered as a syntype of *P. sulphurea*. The collection may be from the time when *Mycologia europaea* was published, 1822 or even a later collection if the script belonged to Desmazières as I assume agreeing with Nannfeldt's opinion (Nannfeldt, in herb.). This specimen is erroneously deposited under *Peziza atrata* Pers. in herbarium L. This was noted by Nannfeldt (in herb.) in 1932, when he revised *P. atrata* before publishing his work 'Studien über der Morphologie und Systematik der nichtlichenisierten und inoperculaten Discomyceten' (Nannfeldt 1932: 158).

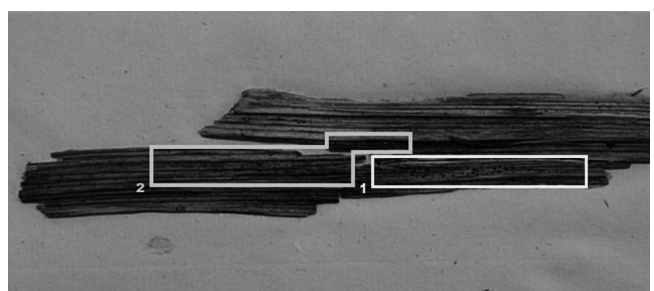
L 910,256-900 (labelled as 'An Var. *Pezizae sulphureae*? Circa Parisios'): the specimen contains only remnants of apothecia, in a drop of KOH, a piece of a base is surrounded by a yellow shine and there is no other reaction to KOH, the excipulum is pale beige from the surface view. Several basal parts of hairs from the basal part of the apothecium were observed and appeared typical of *Trichopeziza*, with a refractive wall which is clearly not brown. The hairs are (2.3)–3.2 μm wide, septate at intervals of 6–12 μm , the wall is 0.7–0.8 μm thick. Its substrate is clearly *Urtica* when compared with *Geum*, Apiaceae and *Urtica* (remnants of smaller *Urtica dioica* plants, not those preferred by *Leptosphaeria acuta* (Moug. et Nestl.) P. Karst.). According to the substrate and locality it is the most suitable specimen for lectotypifying of *P. sulphurea* var. *leucophaea* Pers.

L 910,261-591 (Chaillet's script with '*Peziza atropa* Pers.' with reference to Syn. Meth. Fung., p. 649, is crossed and the specimen is labelled as '*Pezizae sulphureae* var.?'): only several setae were

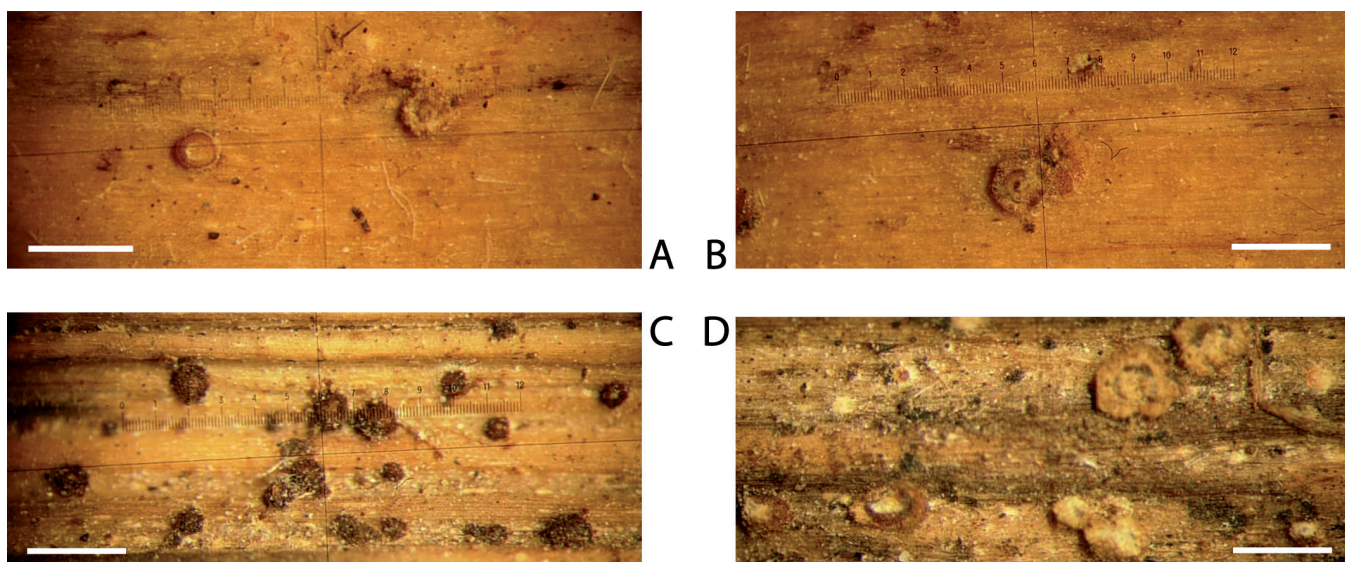
examined and they are typical of *Trichopezizella* Dennis ex Raitv. ss. Haines (1974). The substrate is probably *Aconitum*.

The first two specimens are considered as syntypes of *P. sulphurea*, although one of them is marked as an (unnamed) variety. According to my experience, writings on envelopes need not always agree with the author's final decision. A search was carried out for published infraspecific taxa in Persoon's publications (Persoon 1797, 1800, 1801, 1822) and the variety does not correspond to any published infraspecific taxa. Both specimens may originate from the time of publication – 1797, and therefore they were evaluated. The first specimen contains material with unclear identification but close to *T. violascens*. It is characterised by the 'three-layered excipulum', vinaceous tint of hairs in KOH and no other reaction to KOH. The second specimen contains apothecia of two species: immature apothecia with a violet reaction to KOH, which belong probably to *Trichopeziza sulphurea* and mature apothecia of *Trichopeziza* sp. without any reaction to KOH. The sulphur colour of hairs mentioned by Persoon (1797) is known from *T. sulphurea* as well as from *T. violascens*. In *T. violascens*, the hairs are straw, dilute lemon yellow to brown when fresh and the colour is usually changing from a pale shade at the margin to brown at the flanks. In *T. sulphurea*, the hairs are straw, dilute lemon yellow to luteous when fresh and mostly not changing (Breitenbach et Kränzlin 1984, Baral 2005). The sulphur colour is interpreted as 'a pale lively yellow, with a mixture of white' according to Botanical Latin (Stearn 2004). Persoon distinguished sulphur and lemon ('citrus') colour (e.g. Persoon 1822: 250). In an illustration from 1800 (Persoon 1800), *P. sulphurea* is painted with straw hairs and white discs. The illustration is of a fungus growing on wood (see Persoon 1801: 649), however the colour known from fresh apothecia of *T. sulphurea* and also the colour known from *T. violascens* may agree with it. The subglobose shape of apothecia mentioned by Persoon (1797) indicates to me that the apothecia were young or those having a massive excipulum. During the research in the Czech Republic, *T. leucophaea* ss. Raitviir (1980) was found with apothecia having a massive excipulum in a xeric environment. The apothecia were young in both syntypes.

Later publications are not obligatory for typification, but some observations are included here. A later publication (Persoon 1801: 649) includes information that *P. sulphurea* occurs in spring. *T. violascens* occurs in spring according to the studied specimens from the herbarium PRM. *T. sulphurea* may occur in early spring according to the period of fructification discussed above. Persoon



Text-fig. 6. Original material of *Peziza sulphurea* (syntype L 910,256-897), the substrate with location of apothecia of two species. 1. apothecia which do produce a purple reaction to KOH; 2. apothecia which do not produce a purple reaction to KOH.



Text-fig. 7. Original material of *Peziza sulphurea*. A-B. apothecia in the specimen L 910,261-594; C. apothecia which do produce a purple reaction to KOH in the specimen L 910,256-897; D. apothecia which do not produce a purple reaction to KOH in the specimen L 910,256-897. Scale bars = 1 mm.

(1822: 250) describes the colour of dried apothecia of *P. sulphurea* as ‘colore aliquando fuscens, opaca’ and he also noted that it was a young specimen in spring. The apothecia in *T. sulphurea*, *T. violascens*, and in the undescribed *Trichopeziza* species or population which dissolves to KOH brown particles only become darker when dried. It is different from *T. leucophaea* ss. Raitviir (1980) in which hairs of dried apothecia have a pale brown colours. I cannot decide if young apothecia could be found in the field in spring, however apothecia in both syntypes are young. In the Czech Republic, in the second half of the 20th century, mature specimens of *T. sulphurea* had been collected from the end of July.

Typification of *Trichopeziza sulphurea* (PERS.) FÜCKEL

Persoon’s descriptions are not unambiguous, however, it seems possible to me that *P. sulphurea* was the original description for *T. violascens* or allied species. It is also possible that the original description was wide and that it was defined more precisely by Persoon (1822: 250). For the purpose of typification, the syntypes do not conflict with the original description which says: ‘Sessilis, sparsa, cupula subglobosa, hirsuta sulphurea. Ad stip. herbarum.’ Following recommendation 9A.4 of the International Code of Nomenclature (McNeill et al. 2012), the specimen L 910,256-897 containing *Trichopeziza sulphurea* is chosen for a lectotype. *Trichopeziza violascens* was already segregated by Raitviir (1970) and *Trichopeziza mollissima* s. l. (including *T. violascens*) by Dennis (1962). Part of the specimen L 910,256-897 with immature apothecia, which are smaller, darker and diffusing in 4% KOH colour which penetrates to the medium is designated as the lectotype of *Peziza sulphurea* PERS. As the apothecia are immature, an epitype is selected. The specimen PRM 672828 is designated as the epitype of *P. sulphurea* PERS.:

Lectotype: part of the specimen L 910,256-897 (current number L 0111759), sine data, as *Peziza sulphurea* var., possessing smaller and darker apothecia, which diffuse in 4% KOH colour which penetrates to the medium (for location of the apothecia see Text-fig. 6, number 1), designated here.

Epitype: the Czech Republic, Western Bohemia, Diana virgin forest near Rozvadov, on *Urtica dioica*, 15 September 1964, leg. F. Kotlaba, V. Jechová et Z. Pouzar, PRM 672828, as *Dasyscyphus sulphureus*, designated here.

Acknowledgements

I am indebted to Dr. Zdeněk Pouzar, Dr. Jan Holec and Prof. Richard P. Korf for their advice on historical herbarium collections, and to Dr. Mirko Svrček who gathered a big collection of the species studied. I thank to Dr. Jan Holec for critically reading the manuscript and for his advice on typification and phenology. I also thank the curators of the herbarium L for their help during my stay there. The work was supported by the Ministry of Culture of the Czech Republic (grant nos: DKRVO 2013/06, National Museum, 00023272).

References

- Anonymus (1969): Flora of British fungi. Colour identification chart. – Edinburgh. 1 pl.
- Baral, H. O. (2005): In vivo veritas. Ed. 3. – Manuscripts including macro- and micrographs distributed by author on DVD.
- Breitenbach, J., Kränzlin, F. (1984): Pilze der Schweiz. Band 1. Ascomyceten. Ed. 2. – Verlag Mykologia, Luzern. 313 pp.
- Dennis, R. W. G. (1949): A revision of British Hyaloscyphaceae with notes on related European species. – Mycol. Pap., 32: 1–97.
- Dennis, R. W. G. (1962): A reassessment of *Belonidium* Mont. & Dur. – Persoonia, 2: 171–191.
- Ellis, M. B., Ellis, J. P. (1985): Microfungi on land plants. – Slough. 868 pp.
- Haines, J. H. (1974): Notes on the genus *Trichopezizella* with descriptions of new taxa. – Mycologia, 66: 213–240.
- Hosoya, T., Sasagawa, R., Hosaka, K., Gi-Ho, S., Hirayama, Y., Yamaguchi, K., Toyama, K., Kakishima, M. (2010): Molecular phylogenetic studies of *Lachnum*

- and its allies based on the Japanese material. – *Mycoscience*, 51: 170–181.
- Luijt-Verheij, J. M. W. V. (1973): Overzicht van de Nederlandse soorten van *Dasyscyphus* (Ascomycetes, Hyaloscyphaceae). – 57 pp., 60 tabs., ms. [Doct. thesis; depon. in: Rijksherbarium, University of Leiden].
- McNeill, J., Barrie, F. R., Buck, W. R., Demoulin, W., Greuter, W., Hawksworth, D. L., Herendeen, P. S., Knapp, S., Marhold, K., Prado, J., Prud'homme van Reine, W. F., Smith, G. F., Wiersema, J. H., Turland, N. J. (2012): International Code of Nomenclature for algae, fungi, and plants (Melbourne Code). – Koeltz, Königstein, 208 pp.
- Nannfeldt, J. A. (1932): Studien über der Morphologie und Systematik der nicht-lichenisierten inoperculaten Discomyceten. – *Nova Acta Reg. Soc. Sci. Upsal.*, Ser. 4, 8(2): 1–368.
- Persoon, C. H. (1797): Tentamen dispositionis methodicae fungorum in classes, ordines, genera et familias cum supplemento adjecto. – Lipsiae. 76 pp. 4 tabs.
- Persoon, C. H. (1800): Icones et descriptiones fungorum minus cognitorum. Fasc. 2. – pp. [27]–60. Tab. viii–xiv.
- Persoon, C. H. (1801): Synopsis methodica fungorum. – Gottingae. 706 pp.
- Persoon, C. H. (1822): *Mycologia europaea*. Vol. 1. – Erlangae. 356 pp. 12 tabs.
- Raitviir, A. (1970): Synopsis of the Hyaloscyphaceae. – *Scripta Mycol.*, 1: 1–115, 1 tab.
- Raitviir, A. (1980): The genus *Lasiobelonium*. – *Scripta Mycol.*, 9: 99–132.
- Rehm, H. (1893): Ascomyceten: Hysteriaceen und Discomyceten. Lf. 39–41. – In: Rabenhorst's Krypt.-Fl. Deutschl., Oest. und Schweiz, ed. 2, 1/3, Leipzig, pp. 721–912.
- Saccardo, P. A. (1889): Discomyceteae et Phymatosphaeriaceae. – In Saccardo P. A. [ed.]. *Sylloge fungorum omnium hucusque cognitorum*. Vol. 8. Patavii. pp. 1–859.
- Saccardo, P. A. (1912): *Chromotaxia. Seu nomenclator colorum*. Ed. 3. – Patavii. 22 pp.
- Spooner, B. (1987): Helotiales of Australasia: Geoglossaceae, Orbiliaceae, Sclerotiniaceae, Hyaloscyphaceae. – *Bibliotheca Mycologica*, 116: 1–711.
- Stearn, W. T. (2004): *Botanical Latin*. Fourth edition. – Bath. 546 pp.
- Svrček, M. (1979): New or less known Discomycetes X. – *Česká Mykol.*, 33: 193–206.
- Svrček, M. (1988): New or less known Discomycetes XVII. – *Česká Mykol.*, 42: 76–80.
- Thiers, B. [continuously updated]. *Index Herbariorum: A global directory of public herbaria and associated staff*. New York Botanical Garden's Virtual Herbarium. – <http://sweetgum.nybg.org/ih/>
- Vesterholt, J. (2000): Hyaloscyphaceae Nannf. – In: Hansen L. and Knudsen H. (eds), *Nordic macromycetes*. Vol. 1. Ascomycetes, Copenhagen, pp. 184–211.
- Weber, E. (1992): Untersuchungen zu Fortpflanzung und Ploidie verschiedener Ascomyceten. – *Bibliotheca Mycologica*, 140: 1–186.