

***Jafnea semitosta* (Ascomycota, Pyronemataceae), first collection in the Czech Republic**

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The operculate discomycete *Jafnea semitosta* is reported for the first time from the Czech Republic as the second record from Europe. A description of this species together with line drawings and colour photographs, based on the collection, are given.

Key words: *Jafnea*, description, taxonomy, ecology, Czech Republic.

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Autoři publikují první nález z České republiky a současně druhý evropský nález druhu *Jafnea semitosta* s jeho makroskopickým a mikroskopickým popisem, kresbami a fotografiemi.

INTRODUCTION

During a field excursion to a broadleaved forest in southern Moravia, the first author found a number of apothecia of an interesting discomycete, which we later identified as *Jafnea semitosta* (Berk. et M.A. Curtis) Korf, originally North American species.

The genus *Jafnea* Korf (1960), with the type species *Jafnea fusicarpa* (W.R. Gerard) Korf (based on *Peziza fusicarpa* W.R. Gerard 1873), comprises two closely related species. The type species, *J. fusicarpa*, has a rather wide distribution range being reported from North America (Canada and USA), Japan, and India, and one not yet published recent record from South Korea (based on a collection identified as such by the second author).

In contrast, *J. semitosta* had been for a very long time only known from North America (Canada, USA), where it is especially common in the eastern parts (Kuo 2007, Pascali 2009). Zhuang (1997) published the first record of this species from China, but as is obvious from the description, it is probably a species of a different genus (see Discussion).

Rifai (1968) mentioned a collection published by Teodorowicz (1936) from Poland, which could have been a *Jafnea* species. Apart from that, Rifai erroneously mentioned it as “*Lachnea oligotricha*”, while the correct name is *Lachnea oligochaeta*. However, the characters of this fungus do not seem to represent a *Jafnea*. The detailed description and Latin diagnosis by Teodorowicz (1936) do not mention the characteristic lacunose stipe and also the ascospores are smaller.

Thus the first credible record from Europe is the one published by Benkert and Klofac (2004) from Austria with a description of the collection from Low Austria (Niederösterreich), 1 km S of Dürnkrut, on a rather dry place near a path in an alluvial forest along a stream, Sept. 14 and 24 1996 and Oct. 17 2002, leg. T. Barta. It is interesting that the hitherto known European collections are from Central Europe. The locality of the Austrian collection is situated c. 45 km SSW of the Moravian site. Benkert and Klofac (2004) also discussed the possibility of a recent spread of *J. semitosta* in Europe by the introduction of *Juglans nigra* trees from North America. Nevertheless, they excluded this possibility regarding the Austrian locality. In our case, *Juglans nigra* was not exactly at the collecting site, but it is very common in the forest. Therefore, further field research is necessary to confirm or refuse this hypothesis.

As the Moravian collection represents the first record of this species from the Czech Republic, and the second one in Europe, it is presented here. Moreover, as both macro- and micro-characters vary in the literature, and moreover considerable variability is obvious from the apothecia of our collection, we present here a description and illustrations of this species based on the Moravian collection.

Dedicated to the memory of the Danish mycologist Henry Dissing.

MATERIAL AND METHODS

Macroscopic descriptions of collected specimens are based on fresh apothecia. Microscopic features are described from dried material mounted in H₂O, KOH, and Cotton blue, using an Olympus BX-50 light microscope with a magnification of 1000×. For ascospores, the factors E (quotient of length and width in any one spore) and Q (mean of E-values) are used.

Authors of fungal names are cited according to the International Plant Names Index Authors website (<http://www.ipni.org/ipni/authorsearchpage.do>), and colour abbreviations follow the 1988 edition of Munsell soil color charts. Herbarium specimens are preserved in the herbarium of the Moravian Museum, Brno, Czech Republic (BRNM).

SEM microphotographs were performed using the Tescan Mira 3 LMU electron microscope.

RESULTS

***Jafnea semitosta* (Berk. et M.A. Curtis) Korf**

Figs. 1–14

Basionym: *Peziza semitosta* Berk. et M.A. Curtis in Berk., Grevillea 3(28): 153, 1875.

≡ *Macropodia semitosta* (Berk. et M.A. Curtis) Durand, Journ. Myc. 12: 31, 1906.

≡ *Sepultaria semitosta* (Berk. et M.A. Curtis) Morgan, Journ. Mycol. 8(4): 188, 1902.

≡ *Paxina semitosta* (Berk. et M.A. Curtis) Seaver, The North American Cup-Fungi (Operculates): 209, 1928.

≡ *Jafnea semitosta* (Berk. et M.A. Curtis) Korf, Nagaoa 7: 5, 1960.

= *Peziza hainesii* Ellis, Bull. Torrey Club 8: 65, 1881.

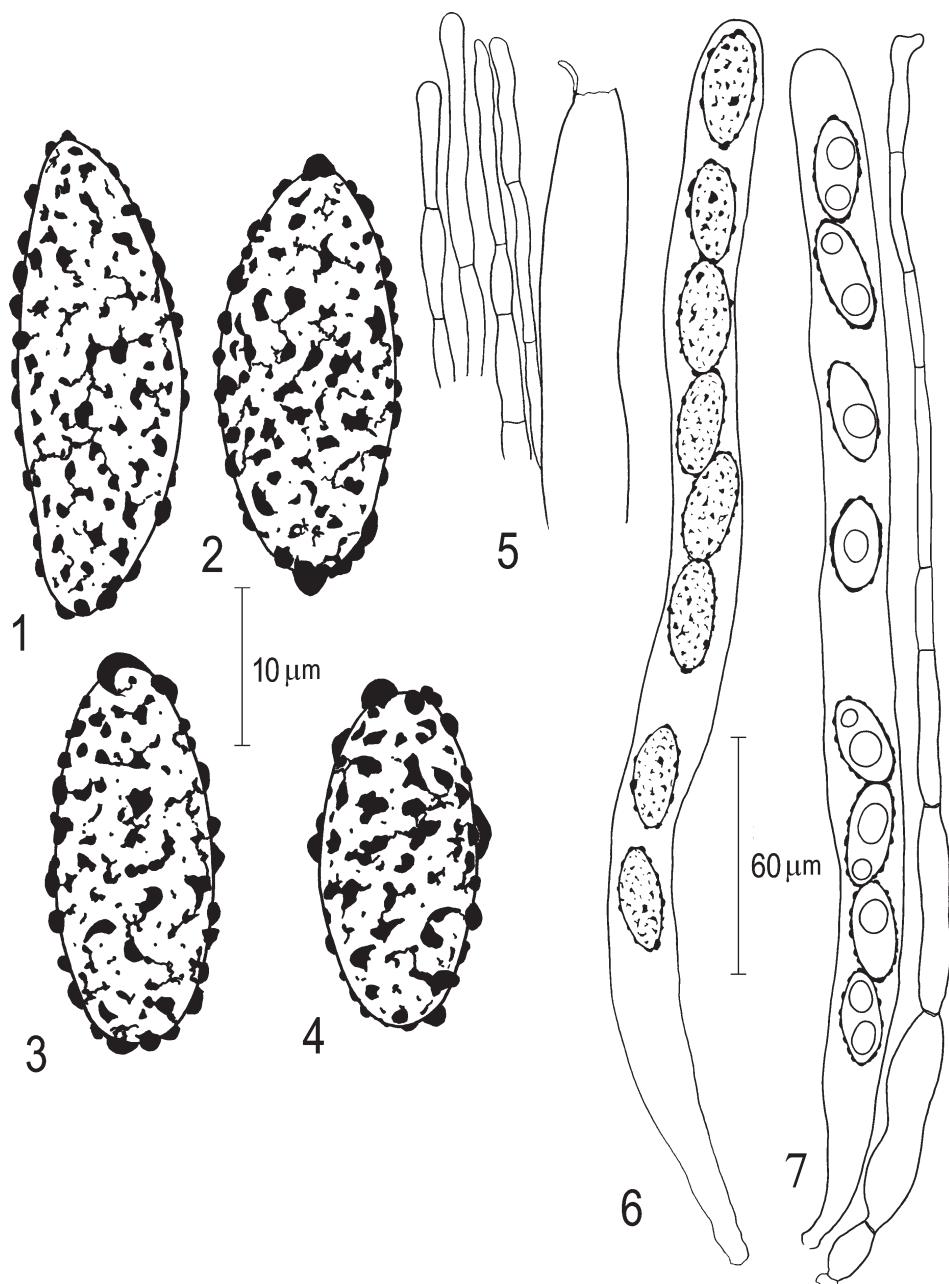
≡ *Scutellinia hainesii* (Ellis) Kuntze, Rev. Gen. Pl. 2: 869, 1891.

Apothecia up to 70 mm wide, almost sphaerical with regular central opening when young, later almost cupulate, with margin turning inwards when old, externally very pale brown ($MU \pm 10YR\ 8/3$), dark brown furfuraceous, hymenium smooth, pale ochraceous- or beige-yellow ($MU\ 7.5\ YR\ 8/4$, later up to $7.5\ YR\ 6/6$), with brown hairs at margin. Basal stipe robust, up to 30×30 mm, distinctly costate, paler than excipulum, brown furfuraceous. Inner content whitish.

Hypothecium consisting of densely arranged hyphae of indefinite shape (textura subepidermoideato subintricata), medullary excipulum a thick layer of a textura intricata to subintricata consisting of compact, interwoven, septate, 3–8 μm wide hyphae which are often inflated up to 20 μm . Ectal excipulum thick, made up of a textura globulosa-angularis, towards the medulla passing into a textura angularis with almost parallel-arranged cells, marginal cells 12–48 μm wide, often brown-coloured, usually thick-walled and of the same shape as the basal cells of marginal and receptacular hairs, mostly irregularly elongated.

Hairs (both marginal and excipular) of very variable density, width, length, coloration and distribution, each originating from a globose to mostly irregularly elongated basal cell which is 20–48 μm in diam., 50–180–800–2000 μm long, 8.5–22.5 μm wide, hyaline to more or less distinctly brown (independently of their length), thin-walled to thick-walled (walls 0.2–1.5–3.1 μm thick), cylindrical, apex obtuse or slightly attenuated, rarely capitate; the longest, densely interwoven, chestnut-brown hairs are mostly distributed near the apothecial margin and usually only 9–15 μm wide.

Asci 8-spored, up to 320 μm long and 15–22(–25) μm wide, cylindrical, with slightly thickened walls at the obtuse, regularly operculate apex, inamyloid. Paraphyses 3–5 μm wide, more or less surpassing the asci, unevenly cylindrical, septate, near the base often inflated up to 12 μm , apex moderately or rather distinctly irregularly clavate to lanceolate, 4.0–6.0(–10.5) μm wide, containing pale to intense yellow-ochre pigment. Ascospores elongate-ellipsoid to nearly fusoid, often of slightly to rather distinctly irregular shape, (26–)28–33(–34) \times 10–12.5 μm , average = $30.2 \times 11.6\ \mu\text{m}$, immature and submature ascospores ellipsoid, strongly cyanophilous with one or two large oil guttules, mature subfusoid



Figs. 1–7. Characters of *Jafnea semitosta*. **1–4:** ascospores, oil immersion + CB; **5:** apical parts of paraphyses and empty ascus; **6:** ascus with ascospores, **7:** ascus with submature ascospores and one paraphysis. Del. J. Moravec.

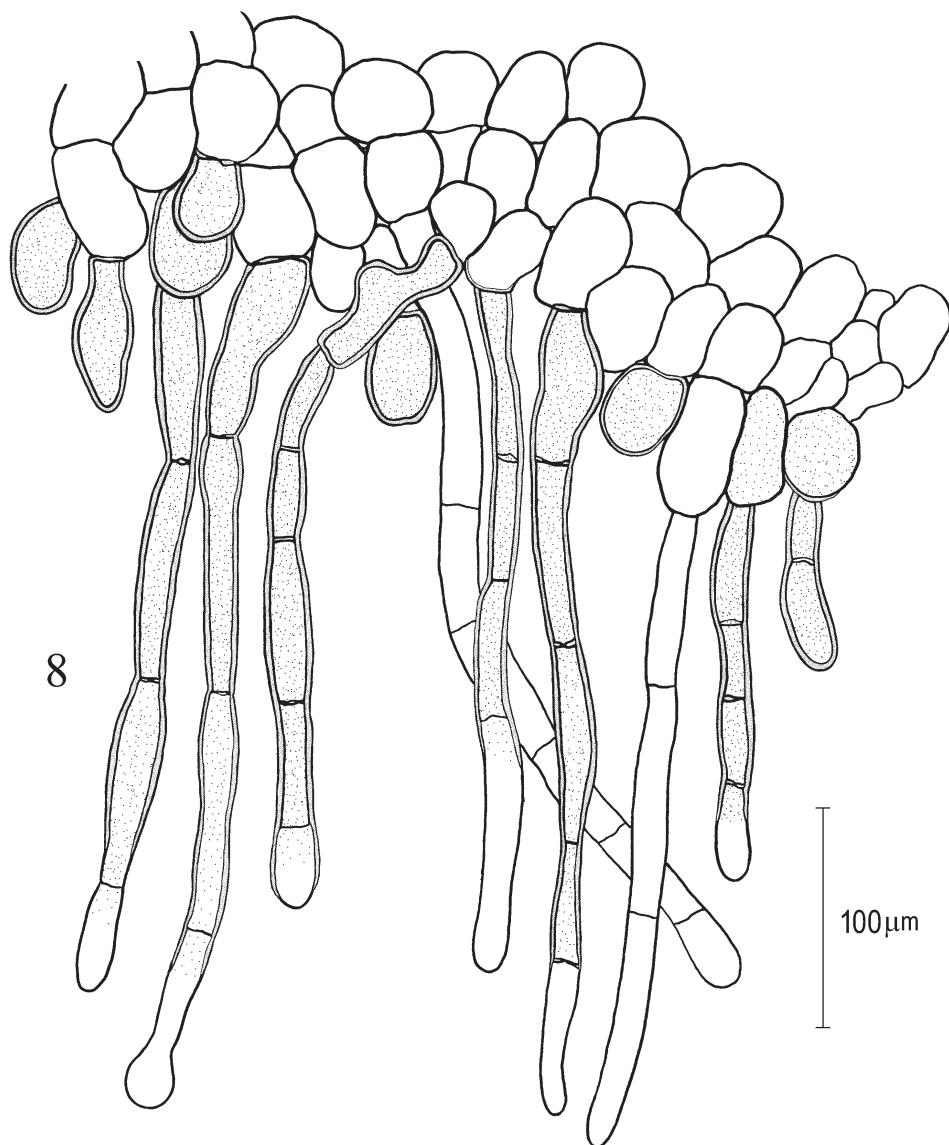


Fig. 8. *Jafnea semitosta*. Part of ectal excipulum with hairs. Del. J. Moravec.

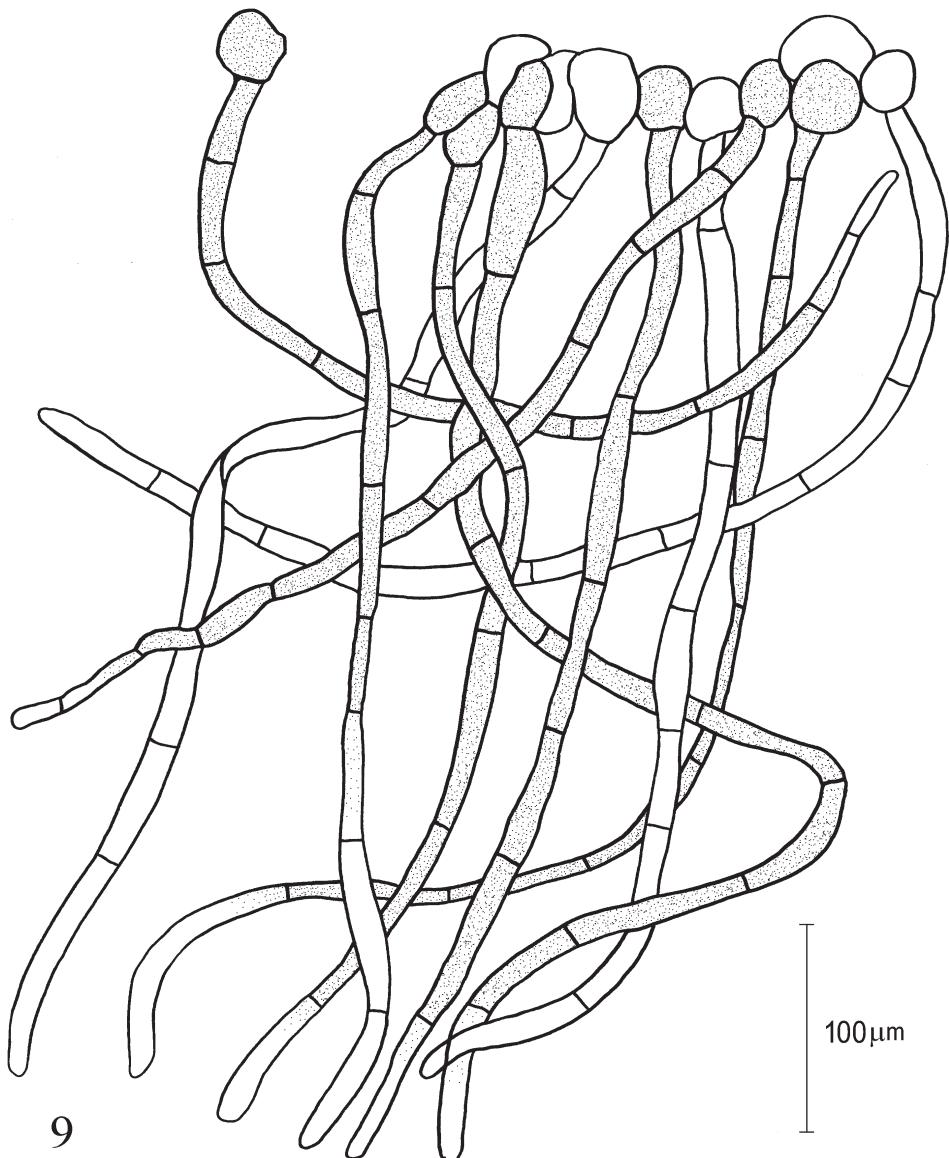


Fig. 9. *Jafnea semitosta*. Interwoven hairs (marginal area of apothecium). Del. J. Moravec.



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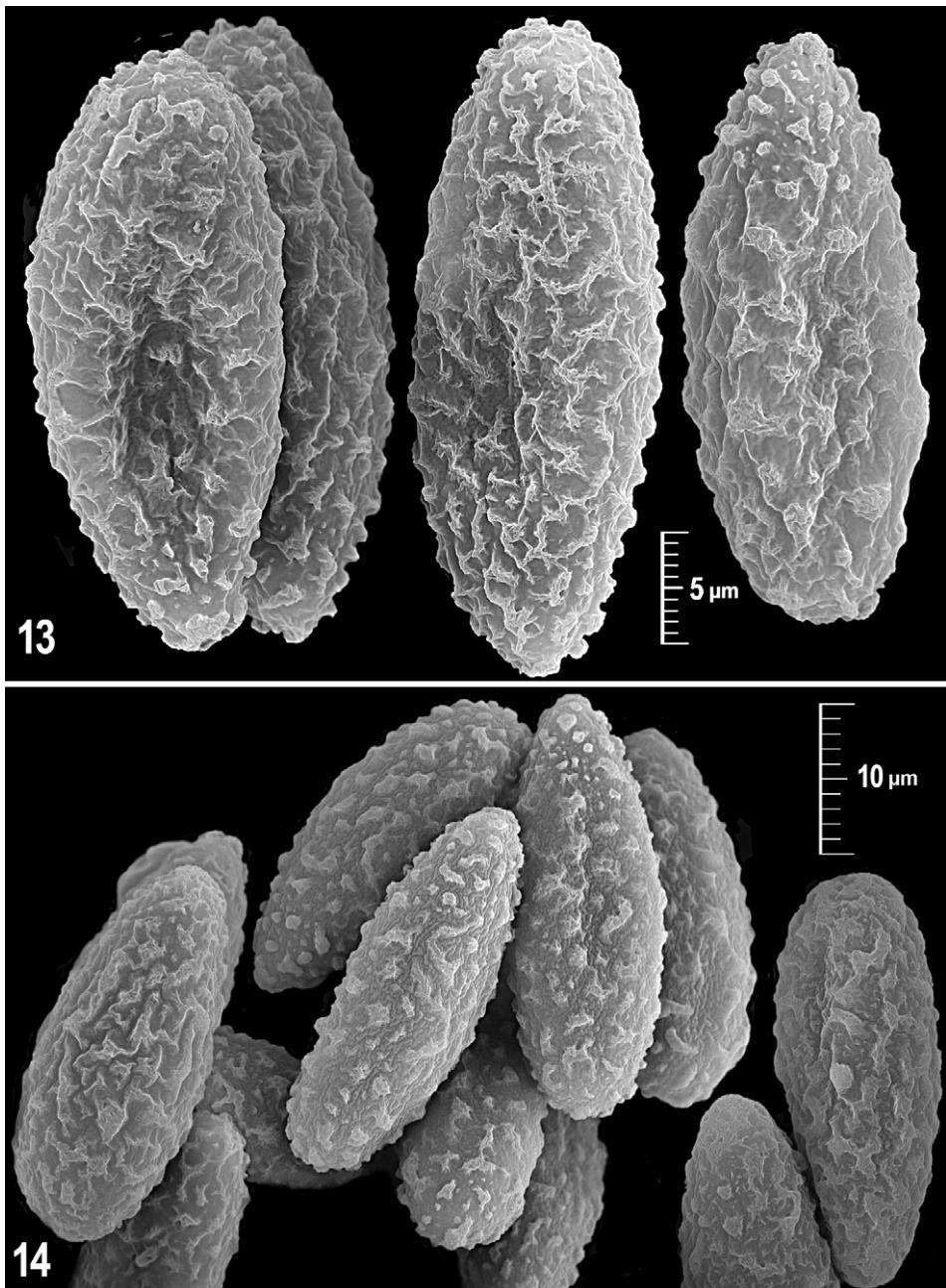


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Figs. 10–12. *Jafnea semitosta*. Apothecia. Photo V. Antonín.



Figs. 13–14. *Jafnea semitosta*. SEM microphotographs of ascospores. Photo L. Ilkovics.

ascospores filled with numerous small oil droplets; perispore covered with a distinct cyanophilous sculpture consisting of rounded or very irregularly shaped and irregularly arranged pustules and warts, 0.3–3.1 µm in diam., 0.1–1.2 µm high, often anastomosing and usually connected by thin crests; pustules often enlarged on ascospore poles forming sometimes “pseudoapiculi” up to 1.6 µm high and 3.0 µm in diam.

Ecology. On soil, especially young apothecia partly immersed in soil, saprotrophic, in a thermophilous forest with *Quercus petraea*, *Carpinus betulus* and *Tilia* sp.

Locality. Czech Republic, Moravia, Dolní Bojanovice, forest “Zlodějský háj”, 48° 51' 29" N, 17° 00' 01" E, c. 220 m alt., 25 Sept. 2010 leg. V. Antonín (BRNM 734401).

DISCUSSION

Jafnea semitosta is a very distinct fungus macroscopically resembling a species of *Sowerbyella* Nannf., due to the markedly developed stipe, or a species of *Geopora* Harnkn., because of the brown hairy character of its excipulum and semi-immersed growth especially when young [the latter genus also includes several terrestrial species previously classified in *Sepultaria* (Cooke) Boud.]. However, the combination of macro- and microscopic characters clearly differentiate *Jafnea* from both genera.

Jafnea semitosta is obviously a very variable species. Most authors stated the length of ascospores as 25–35 µm. The ascospores of some apothecia of our collection were mostly 27–29 µm long, only a few of them reached 30 µm, while those from other apothecia often surpassed 30 µm. The density and length of the hairs also vary. Korf (1960) described them as “short, brown, superficial” while Kuo (2007) treated the apothecia as “finely and sparsely hairy with brown hairs”, and Benkert and Klofac (2004) measured hairs of up to 600 µm in length. The difference in the length of the hairs in the Moravian collection, which reach up to 2000 µm, is given in the description above. The hairs do not seem to be differentiated into marginal and receptacular, although they are the longest near the margin, and both the hyaline and brown hairs occur together independently of the excipular area.

It seems that the ecology of *J. semitosta* is also very diverse. It was reported several times as growing “near rotting wood”. However, the ecology of the collection from China by Zhuang (1997) “on wood of a broadleaf tree, alt. 1300 m”, as well as the description given by Zhuang, shows that she probably had a different fungus in her hands. This is particularly obvious from the following characters given by Zhuang: apothecia up to not more than 10 mm in diam. when dry and no stipe mentioned, cells of ectal excipulum somewhat purplish brown, hyphae of medullary excipulum only 2.5–4 µm wide, ascospores 21–27 × 9–11 µm, with warts

only 0.3–0.5 µm in diam., paraphyses only 2–4 µm wide. Moreover, she did not mention the presence of any hairs.

The genus *Jafnea* was proposed by Korf (1960), originally for three species. The type species *Jafnea fusicarpa* differs from *J. semitosta* principally by smaller apothecia (up to 30 mm in diam.), thus resembling a species of *Geopora* (but with a well-developed stipe), and larger, more constantly fusoid, 30–45 µm long ascospores (Korf 1960, Rifai 1968, Kuo 2007). The third species, *Jafnea imaiii* Korf, described by Korf in the same paper, was later transferred by Rifai (1968) to the genus *Jafneadelphus* Rifai, but its recent name combination is *Aleurina imaiii* (Korf) W.Y. Zhuang et Korf. The type species of the related monotypic genus *Nothojafnea* Rifai (1968), *N. cryptotricha* Rifai, preserved in herb. K, was examined by the second author some years ago. This species, described from Java, is principally distinguished by shorter, rigid, strongly thick-walled (but obtuse) hairs and smaller, finely warted, regularly ellipsoid ascospores.

The history of the taxonomy and classification of *Jafnea* is highly interesting. Korf (1960) widely discussed the systematic position of *Jafnea* within *Pezizaceae* including a hypothesis on its relationship to *Helvellaceae*, which he questioned. Despite his opinion that “the genus does not seem to be closely related to either *Humaria* Fuckel or *Sepultaria* (Cooke) Boud.” (= *Geopora*), he supposed that the genus might belong to *Ciliarieae*, a heterogenous tribe corresponding to *Humariaceae*, but he mentioned also a close relationship to the hypogeous genus *Genea* Vittad. Rifai (1968) also placed *Jafnea* into *Humariaceae* (a subfamily included now into *Pyronemataceae*). Based on a cytological study, Berthet and Korf (1969) excluded the classification of *Jafnea* within *Helvellaceae* and placed it near the genus *Pustulina* Eckblad [= *Tarzetta* (Cooke) Lambotte].

Recent results of a phylogenetic study of a great number of species of many genera of *Pyronemataceae*, including *J. fusicarpa*, was published by Perry et al. (2007). The results indicate an outstanding position of *Jafnea*, surprisingly in the same clade with the genus *Smardaea* Svrček but considerably distant from the morphologically related genera *Geopora*, *Genea* and *Tarzetta*, as well from *Aleurina imaiii*.

All species of the genus *Smardaea* [type species *S. amethystina* (W. Phillips) Svrček] principally differ by sessile to subsessile apothecia lacking well-developed apothecial hairs, and by presence of purple pigment. In short, we suppose that only a comprehensive molecular study may confirm the very heterogenous results in the study by Perry et al. (2007), namely the great divergences in some of the tested species within some genera, which mostly fundamentally disagree with the classification based on morphological characters, for instance between some species of *Melastiza* Boud.

Colour photographs of *J. semitosta*, which agree well with our collection, were published by e.g. Benkert and Klofac (2004), Bessette et al. (1997), and Kuo (2007).

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REFERENCES

- BENKERT D. and KLOFAC W. (2004): *Jafnea semitosta* (Ascomycetes, *Pezizales*), ein amerikanischer Becherling offenbar erstmals in Europa. – Österr. Z. Pilzk. 13: 55–59.
- BERTHET P. and KORF R. P. (1969): Sur la position taxonomique du genre *Jafnea* Korf. – Natural. Canad. 96: 247–249.
- BESSETTE A. E., BESSETTE A. R. and FISCHER D. W. (1997): Mushrooms of northeastern North America. – 784 p. Syracuse.
- KORF R. P. (1960): *Jafnea*, a new genus of the *Pezizaceae*. – Nagaoa 7: 1–8.
- KUO M. (2007): *Jafnea semitosta*. – Retrieved from the Mushroom Expert.Com Web site:
http://www.mushroomexpert.com/jafnea_semitosta.html. [accessed Nov. 5, 2010]
- PASCALI U. (2009): 2009 Fall Forays Report. –
<http://www.myctor.org/2009%20Fall%20Forays%20Umberto%27s%20Report.htm>. [accessed Nov. 5, 2010]
- PERRY B. A., HANSEN K. and PFISTER D. H. (2007): A phylogenetic overview of the family *Pyronemataceae* (Ascomycota, *Pezizales*). – Mycol. Res. 111(5): 549–571.
- RIFAI M. A. (1968): The Australasian *Pezizales* in the herbarium of the Royal Botanic Gardens Kew. – Verh. Koninkl. Nederl. Akad. Wetensch., Nat., Tweede Reeks, 57(3): 1–295.
- TEODOROWICZ F. (1936): Grzyby wyzsne Polskiego wybrzeza. – Towarz. Nauk. Toruń. Badania Przr. Pom. 2(3): 5–65.