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The troublesome genus *Thamnolia* (lichenized Ascomycota)

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Abstract: A new neotypus is designated for *Thamnolia vermicularis* in accordance with the protologue. The taxonomy is best reflected by molecular evidence which recognizes three subspecies: the widespread subsp. *vermicularis*, and the geographically more restricted subsp. *taurica* (in the eastern Alps) and subsp. *tundrae* (in the Arctic region). The nomenclatural consequences resulting from these changes require that two new combinations are made.

Key words: nomenclature, taxonomic ranking, typifications

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Introduction

Thamnolia is a conspicuous genus of lichenized ascomycetes with taxa growing on naked soil in arctic-alpine regions throughout the Northern Hemisphere (Fig. 1). It was described by Schaerer (1850) with a name originally proposed by Acharius in a letter to him in 1819, shortly before Acharius' sudden death. Schaerer was obviously unaware that Gray (1821) had already taken up another name, *Cerania*, for the genus. Later, the more frequently used name *Thamnolia* was conserved over *Cerania*.

Schaerer accepted only one species, originally described by Swartz (1781) as *Lichen vermicularis* (Fig. 2), with three varieties reflecting the morphological variation. It was already pointed out in the original description that no fully developed fruiting bodies had been observed, only some "lumps" possibly being incipient forms. To date, specimens of this genus have never been observed fruiting. Records to the contrary are caused by observations of the fruiting structures of parasites, the most common being *Thamnogalla crombei* (Mudd) D. Hawksw. (syn. *Stegia vermicularis* (Arnold) Keissl.). This lack of fruiting bodies has made it difficult to place the genus in the lichen taxonomic system. Keissler (1960) placed it, as had Zahlbruckner (1926), in the *Usneaceae*. Only recently has it been placed correctly, by Platt & Spatafora (2000) using molecular methods, among the *Pertusariales*, a position which has been confirmed by subsequent investigations (Lücking *et al*. 2016).

Species delimitation within *Thamnolia*, as already indicated when the genus was established, has also been difficult to determine. The many different growth forms have been given various names and ranks (Minks 1874; Keissler 1960) but when they were chemically tested none of them correlated completely with the chemical variation. Consequently Asahina (1937) established a separate species, *T. subvermicularis*, for the chemotype containing squamatic and baeomycetic acids (UV+), although this was not generally accepted. Nevertheless, some lichenologists who found different distributional trends in relation to the chemistry (e.g. Sato 1959) accepted this chemotype as a variety under the name var. *subuliformis* (Ehrh.) Schaerer (of which *T. subvermicularis* Asah. is a synonym). Culberson (1963) subsequently treated the genus and emphasized the chemistry when circumscribing and naming the taxa, accepting two species which he called *Thamnolia vermicularis* and *T. subuliformis*. This has been a matter of debate ever since (see e.g. Kärnefelt & Thell 1995).

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FIG. 1. *Thamnolia vermicularis* in the mountains in Vågå, Norway. Photograph: T. Schwenke. In colour online.

Culberson (*op. cit.*) also made several neotypifications of the names (see below).

Recent molecular studies (Onut-Brännström *et al.* 2018) have helped clarify these problems which confused taxonomists in the past. These authors showed that there are three taxonomic entities, one strictly Arctic, one in the Alps and one widespread in the Northern Hemisphere (with a few localities also in the Southern Hemisphere). They accepted these taxa as three species, though each of them shows approximately the same variation in chemistry and morphology so that they are indistinguishable without molecular data. The naming and ranking of these taxa need further consideration, particularly since the genus is not known to reproduce sexually, a fact not discussed by these authors.

Nomenclature

When Culberson revised the genus, he searched in vain for the original material of the three oldest specific names. Instead he designated neotypes, prioritizing specimens affiliated to the authors (i.e. historical specimens). This was not a wise strategy, since the specimens he designated were mostly of

vermicularis. 67-68. LICHEN fruticulosus lævis subramosus ramis diffusis tuberculis sparsis.
Habitat in *alpibus Lapponicis* inter gramina et muscos, fruticulis prostratis et diffusis, ascarides primo intuitu referentibus.
Descr. LICHEN lacteus; ramis teretiusculis fistulosis magis minusve ramosis subulatis, fructificationibus lateralibus globosis.
L. Subulato similis, sed hujus color & situs diffusus et tuberculi globosi ab illo discedunt.

FIG. 2. The original protologue of *Lichen vermicularis* in Swartz (1781).

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doubtful origin and in some cases not from the region where the names were described. In any case, neotypes can under certain circumstances be superseded (Art 9.19). Onut-Brännström *et al.* (2018) were aware of this problem but failed to take the appropriate action, as shown below. They claimed that it was best to wait until original material was rediscovered and therefore retained Culberson's rather unfortunate choices. This approach causes unnecessary nomenclatural confusion which can be efficiently remedied in the following way.

1. *Lichen vermicularis* Sw. was described from 'alpibus lapponicis' (Fig. 2) but Culberson did not find any such material in Swartz' herbarium (SBT), only a sheet with three different collections (Fig. 3) without localities. He chose the central one, inscribed above with '*Cladonia subuliformis*' in Swartz' handwriting. This strongly indicates that Swartz had obtained this specimen under that name from another, possibly Central European source where this name was in use since Hoffmann introduced it in 1794. That supposition is confirmed by the molecular studies of Onut-Brännström *et al.* (2018), so the neotype does not preserve the general usage of the name *Thamnolia vermicularis*. Thus, the neotype chosen by Culberson is in conflict with the original diagnosis; this is serious since geography plays an important role in the taxonomy, as demonstrated by Onut-Brännström *et al.* (2018). Due to this incorrect neotype, Onut-Brännström *et al.* (2018) transfer the name *Lichen vermicularis* described from Lapland to a taxon restricted to the Alps. A new neotype can and should have been chosen. Rather than selecting the specimen inscribed only with 'Lapponia' in Acharius' herbarium (H, UPS), without collector (and therefore not undisputed original material), I designate a modern one from this region, one with molecular data available.

2. *Lichen subuliformis* Ehrh. was described from Harz in Germany (Ehrhart 1788). The neotype chosen by Culberson is a specimen detailed in Ehrhart's cryptogam exsiccate (no. 30) without locality. This exsiccate was issued between 1785 and 1795 (Körber 1855), just in the period when Ehrhart described this species, so this might actually be part of the original collection (the exact date of this number is rather uncertain, see Sayre (1969)). However, the title of the exsiccate casts doubt over the place of origin. It reads: *Plantae cryptogamae linneae in locis earum natalibus collegit*. Even though there is doubt about the origin of this neotype, it is impossible to prove that the neotype is in contradiction with the diagnosis so it cannot be superseded. In any case, there would not be much to gain from that as this name appears to be a synonym of the former, despite the difference in chemistry.

3. *Lichen tauricus* Wulfen was described from Tabern in Austria (1789) but the neotype (in BM) chosen by Culberson has no locality, though it is supposed to have been annotated by Wulfen (names only). In this case, original material in the form of table 12, fig. 2 (Fig. 4) in Jacquin's work has become available for typification through changes in the nomenclatural rules since Culberson's paper. That illustration is the obligatory lectotype, because no other indisputable original material is known. Since this drawing does not reveal the essential characters, an epitype must be designated, one which has been molecularly studied, to secure a precise application of this name.

There is a further name from 1789 at species level for a presumed member of the genus, *Lichen tubulosus* Vill. (Villars 1789). No original material was located by Culberson, who refrained from designating a neotype as the name is younger than any of the others and would accordingly, in any case, be a synonym. This fact remains unchallenged.

Taxonomy

Onut-Brännström *et al.* (2018) convincingly showed that the thallus chemistry is unsuitable for species delimitation, and that three taxa are present according to the molecular analysis. However, the rank of these taxa is open to discussion, particularly since the genus has never been found fertile and clonal formation may

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FIG. 3. The neotype designated by Culberson (1963) in Swartz' herbarium (SBT); the middle specimen is inscribed *Cladonia subuliformis*. In colour online.

FIG. 4. Lower specimen in Table 12 of Wulfen's paper on lichens in Jacquin (1789) showing the lectotype of *Lichen taurica*. In colour online.

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occur. As the authors themselves emphasize, the three are indistinguishable morphologically but according to the molecular data occur in different geographical regions. Such taxa with overlapping morphology but distinct geographical/ecological occurrences are traditionally ranked as subspecies, in conformity with a pattern of a species which has formed three distinct infraspecific lineages in its evolutionary history. I see no reason why this should not be applied here. Subspecies can of course be genetically distinct so that is not in itself a criterion for choosing specific rank.

Conclusions

From the facts presented above, the following names are valid for the three accepted taxa:

Thamnolia vermicularis (Sw.) Schaer. (subsp. vermicularis)

Enum. critic. lich. europ. (Bern): 243 (1850).—*Lichen vermicularis* Sw., *Meth. Muscorum*: 37 (1781); type: Sweden, Lule Lappmark, Stora Sjöfallet, 2009, *A. Nordin* (UPS L-520827, neotypus, hic designatus!)[GenBank Accession numbers: KY550215, KY634076, KY634053].

Thamnolia vermicularis subsp. taurica (Wulfen) P. M. Jørg. comb. nov.

MycoBank No.: MB 828311

Lichen tauricus Wulfen in Jacquin: *Collectanea Bot.* **2**: 177 (1789); type: Tab.12, 2 of that work (lectotypus, hic designatus!); epitype: Austria, Wolkerskogel, 2012, *T. Spribille & W. Obermayer* (UPS L-774098, hic designatus!, MB 383902) [GenBank Accession numbers: MF149099, MF143813, MF143818].

Thamnolia vermicularis subsp. tundrae (Onut-Brännström & Tibell) P. M. Jørg. comb. nov.

MycoBank No.: MB 828312

Thamnolia tundrae Onut-Brännström & Tibell, *Lichenologist* **50:** 71 (2018); type: Sweden, Jämtland, Åre, Täljstensvallen, 2012, *A. Larsson* 95 (UPS L-812491, holotypus) [GenBank Accession numbers: MF14914, MF1414389, MF143810].

These three taxa have different distributions as shown by Onut-Brännström *et al.* (2018): subsp. *vermicularis* (called *T. subuliformis* by Onut-Brännström *et al.*) is widespread throughout the world, while the other two are more restricted. Subspecies *tundrae* is found in the Arctic tundra from the Aleutians to northern Scandinavia, while subsp. *taurica* is known from high-alpine habitats in the eastern Alps, Tatra Mts and western Carpathians.

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References

Asahina, Y. (1937) Lichenologische Notizen IX. *Journal of Japanese Botany* **13:** 315–321.

Culberson, W. L. (1963) The lichen genus *Thamnolia*. *Brittonia* **15:** 140–144.

Ehrhart, C. (1788) *Beiträge zur Naturkunde und den damit Verwandten Wissenschafter III*. Hannover: Schmidtische Buchhandlung.

Gray, S. F. (1821) *A Natural Arrangement of British Plants, Vol. I*. London: C. Baldwin.

Hoffmann, G. F. (1794) *Descriptio et Adumbratio Plantarum e Classe Cryptogamica Linnaei Lichenes Dicuntur II*. Leipzig: Crusium.

Jacquin, N. J. von (1789) *Collectanea ad Botanicam, Chemiam et Historiam Naturalem II*. Wien: Wappleriana.

Kärnefelt, I. & Thell, A. (1995) Genotypic variation and reproduction in natural populations of *Thamnolia*. *Bibliotheca Lichenologica* **58:** 213–234.

Keissler, K. von (1960) *Thamnolia*. In *Dr. L. Rabenhorst's Kryptogamen-Flora von Deutschland, Österreich und der Schweiz*. 2. Aufl., Band 9, Abt. 4: 700–716. Leipzig: Akademische Verlagsgesellschaft.

Körber, W. (1855) *Systema Lichenum Germaniae*. Breslau: Trewendt & Granier.

Lücking, R., Hodkinson, B. P. & Leavitt, S. D. (2016) The 2016 classification of lichenized fungi in the Ascomycota and Basidiomycota – approaching one thousand genera. *Bryologist* **119:** 361–416.

Minks, A. (1874) *Thamnolia vermicularis*, eine Monographie. *Flora* **57:** 337–347.

Onut-Brännström, I., Johanneson, H. & Tibell, L. (2018) *Thamnolia tundrae* sp. nov., a cryptic species and putative glacial relict. *Lichenologist* **50:** 50–75.

Platt, J. L. & Spatafora, J. W. (2000) Evolutionary relationships of nonsexual lichenized fungi: molecular phylogenetic hypotheses for the genera *Siphula* and *Thamnolia* from SSU and LSU rDNA. *Mycologia* **92:** 475–487.

Sato, M. (1959) Mixture ratio of the genus *Thamnolia* collected in Japan and adjacent regions. *Miscellanea Bryologica et Lichenologica* **1**(22): 1–6.

Sayre, G. (1969) Cryptogamae exsiccatae – an annotated bibliography of published exsiccatae of Algae,

Lichens, Hepaticae and Musci. *Memoirs of the New York Botanical Garden* **19:** 1–174.
Schaerer, L. E. (1850) *Enumeratio Critica Lichenum Europaeorum quos ex Nova Methodo Digerit*. Bernae: Sumtibus auctoris excudebat Officina Staempfliana.
Swartz, O. P. (1781) *Methodus Muscorum Illustrata*. Uppsala: J. Edman.
Villars, D. (1789) *Histoire des Plantes de Dauphiné. Tome Troisième*. Grenoble: Société Royale de Médecine.
Zahlbruckner, A. (1926) Lichenes (Flechten). B. Spezieller Teil. In *Die Natürlichen Pflanzenfamilien* 2nd edition, Vol. **6** (A. Engler & K. Prantl, eds): 61–270. Leipzig: W. Engelmann.