

The troublesome lichen genus *Thamnolia* (lichenized Ascomycetes).

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Abstract: A new neotypus is designated for *Thamnolia vermicularis* in accordance with the protologue. It is argued that the variation is at the moment taxonomically best reflected in three subspecies according to the molecular evidence: the widespread subsp. *vermicularis* and the geographically more restricted subsp. *taurica* (in the Alps) and subsp. *tundrae* (in Arctic tundra). The nomenclatural consequences of this view are taken and two new combinations made.

Key words: nomenclature, taxonomic ranking, typifications.

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Introduction

Thamnolia is a conspicuous lichen genus 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 being originally proposed by Acharius in a letter to him in 1819, shortly before Acharius' sudden death. Schaerer was obviously unaware of that Gray (1821) already had 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 pointed out already in the original description that no fully developed fruitbodies had been observed, only some "lumps" possibly being incipient fruitbodies. Until this day specimens of this genus has never been found fruiting. Records to the contrary are caused by observations of parasites, the commonest 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 system. Keissler (1960) placed it, like Zahlbruckner (1926), in the Usneaceae. Only recently it was placed it correctly, among the Pertusariales by Platt & Spatafora (2000) using molecular methods, a position which has been confirmed by subsequent investigations (Lücking & al. 2016)

Species delimitation as within *Thamnolia*, as indicated already when the genus was established, has also been difficult some to come to terms with. The many different growth-forms were given various names and ranks (Minks 1874, Keissler 1960), but when they were chemically tested none of them correlated completely with the chemical variation. This caused Asahina (1937) to establish a separate species, *Th. subvermicularis*, for the chemotype containing squamatic and baeomyctic acid (UV+). 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). When Culberson (1963) treated the genus, paying much attention to the chemistry when circumscribing and naming the taxa, he accepted two species which he called: *Thamnolia*

vermicularis and *Th. subuliformis*. This has ever since been a matter of debate (see e.g. Kärnefelt et Tell 1995). Culberson (op. cit.) also did several neotypifications of the names (see below).

Recent molecular studies (Onut-Brännström et al. 2018) have cut through this jungle of variation which has 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). These taxa were accepted as three species by them, though each of them more or less shows the same variation in chemistry and morphology, so that they are indistinguishable without molecular data. The naming and ranking of these taxa needs further consideration, particularly since we are dealing with a genus not known to reproduce sexually, a fact not discussed by these authors.

Nomenclature

When Culberson revised the genus, he searched in vain for original material of the three oldest specific names. Instead he designated neotypes, paying most attention to find specimens affiliated to the authors, i.e. historic specimens. This was not a wise strategy, since the specimens he designated mostly were of doubtful origin and in some cases not from the region where the names were described from. Anyway, neotypes can under certain circumstances be superseded (Art 9.19). Onut-Brännström & 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 unlucky choices. This attitude is causing unnecessary nomenclatural confusion which can be corrected quite easily and immediately, in the following way.

1. *Lichen vermicularis* Sw. was described from 'alpinus lapponicus' (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, above inscribed *Cladonia subuliformis*, in Swartz' handwriting. This strongly indicates that Swartz had got 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 by Onut-Brännström & al. (2018), so the neotype does not preserve the the general usage of the name *Thamnolia vermicularis*. Thus the neotype chosen by Culberson is in conflict with the original diagnosis, and that is serious since geography plays an important role in the taxonomy as demonstrated by Onut-Brännström & al. (2018). Because of this incorrect neotype they transfer the name *Lichen vermicularis* described from Lappland to a taxon restricted to the Alps. A new neotype can and should have been chosen. Rather than selecting the specimen inscribed 'Lapponia' in Acharius herbarium (H, UPS), one that might have been collected by Swartz (or Wahlenberg), I designate a modern one where molecular analyses have been done.

2. *Lichen subuliformis* Ehrh. was described from Harz in Germany (1788). The neotype chosen by Culberson is one in Ehrhart's cryptogam exsiccate (nr.30) without locality. This exsiccate was issued between 1785 and 1795 (Körber 1855), just in the period when Ehrhart described this species, so this may actually be part of the original collection (the exact date of this number is a bit uncertain, see Sayer (1969)). However, the title of the exsiccate casts doubt over the place of origin. It reads: *Plantae cryptogamae linnae in locis earum natalibus collegit*. This means that Ehrhart collected these specimens around the place of his native village. Ehrhart was born in Holderbank near Bern in Switzerland (Alpers 1905), but the exsiccate was issued in Hannover where he lived at the time of the

issuing. Even though there is doubt about the origin of this neotype, it is accordingly impossible to prove that the neotype is in contradiction with the diagnosis, so it cannot be superseded. Anyway, there would not be much to gain from that as this name appears to be a synonym of the former in spite of 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 the table 12, fig.2 (Fig.4) in Jaquin's work has become available for typification by changes in the nomenclatural rules since Culberson's paper. That illustration is the obligatory lectotype, since no other indisputable original material is known. Since this is a drawing not revealing the essential characters, an epitype must be designated, one which has been molecularly studied, securing a precise application of this name.

There is a further name from 1789 on species level of a presumed member of the genus, *Lichen tubulosus* Vill. No original material was located by Culberson who refrained from designating a neotype as the name is younger than any of the others, and accordingly would, 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 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 with 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.) Schaerer (subsp. *vermicularis*)

Lichen vermicularis Sw, Meth. *Muscorum*: 37 (1781). Type: Sweden, Lule Lappmark, Stora Sjöfallet, 2009 A. Nordin (UPS L-520827, neotypus, hic designatus!). [GB numbers: KY550215, KY634076, KY634053]

Thamnolia vermicularis subsp. *taurica* (Wulfen) P. M. Jørg., comb. nov. Mycobank No.: MB xxxx

Lichen tauricus Wulfen in Jacquin: *Coillectanea Bot.* II: 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!) [GB numbers: MF149099, MF143813 MF143818].

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

Mycobank No.: MB xxxx

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

These three taxa have a different distributions as shown by Brännström et al. (2017): subsp. *vermicularis* (called *Th. subuliformis* by Onut-Brännström et al.) is widespread worldwide, while the two others are more restricted. Subsp. *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

- Alpers, F. (1905) Friederich Ehrhart. *Separate Schriften des Vereins für Naturkunde an der Unterweser II*, 452pp.
- Asahina, Y. (1932) 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 zu Naturkunde III*. Hannover.
- Gray, S. F. (1821): *A natural arrangement of British Plants, I*. London.
- Hoffmann, G. F. (1794) *Descriptio et adumbration plantarum classe cryptogamice Linnæi lichenes dicuntur II*. Leipzig.
- Jacquin, N. J. von (1789) *Collectanea ad botanicam, chemicam et historiam naturalem II*. Wien
- 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 Rabenhorst Kryptogamenflora (ed.2) vol. **9,4**: 700-716.
- Lücking, R., Hodkinson, B. P., & Levitt (2016) Classification of lichenized fungi in Ascomycota.- Approaching pone thousand genera. *The 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* 923(3): 475-487.

Sato, M. (1959) Mixture ratio of the genus *Thamnolia* collected in Japan and adjacent regions. *Miscellanea bryologica et lichenologica* **I(22)**: 1-6.

Sear, 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**: 1-174.

Schaerer, L. E. (1850) *Enumeratio critica lichenum europaeum*. Bern

Swartz, O. (1781) *Methodus muscorum*. Uppsala.

Villars, D. (1789) *Histoire des plantes de Dauphinée III*. Lyon

Zahlbruckner, A. (1926) Lichenes. B. Spezieller Teil. In Engler & Prantl: *Die natürlichen Pflanzenfamilien*, 2nd edition, vol.6. Leipzig.

FIGURETEXTS

Fig.1 *Thamnolia vernicularis* in the mountains in Norway, Vågå. Photo: T. Schwenke

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

Fig.3 The neotype by Culberson in Swartz' herbarium (SBT), the middle specimen inscribed *Cladonia subuliformis*.

Fig.4 Table 12 in Wulfen's paper on lichens in Jacquin (1789). The lectotype of *Lichen taurica* below.