

Additions and changes to the species list of Estonian bryophytes

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Abstract: Since the last additions (Vellak et al., 2021), four new species should be added to the list. Two of these (*Calypogeia fissa* and *Timmia austriaca*) are new finds, two (*Hedwigia emodica* and *Syntrichia ruraliformis*) were earlier known as varieties in Estonia. One species (*Seligeria patula*) should be excluded from the list since the voucher specimen was re-identified as *S. calcarea* and no other specimens were found among all collected specimens of genus *Seligeria* in Estonian herbaria and during inventories of genus *Seligeria* at all known localities in Estonia in 2020–2021. The number of species in Estonian bryoflora is now 615. The distribution and threats on the new species in Estonia are not known yet and need further inventories, thus all are evaluated here as data deficient (DD). Estonian names for all new species are presented in parenthesis and the distribution and ecology is briefly discussed.

Keywords: mosses, liverworts, habitats, distribution

INTRODUCTION

Almost every year brings changes to the list of Estonian bryophyte taxa. This is mainly caused by new data collected during inventory projects in different regions and plant communities. The knowledge of bryophytes has been risen among the people involved in the inventories: students, nature conservationists and ecologists. In addition, the publication of the new checklist of European bryophytes (Hodgetts et al., 2020) has stimulated the search for the species found in nearby countries of Estonia. No invasive species has been found among the new Estonian species. Although several species are declining in Estonia, the threat category for some species has been lowered during last evaluation also due to new findings (Ingerpuu et al., 2018). All new species are evaluated as DD since additional data is needed for reasonable IUCN categorisation.

MATERIAL & METHODS

All Estonian herbaria and databases eElurikkus and EELIS were searched for new records. The specimens collected during recent inventories and many older doubtful specimens were re-identified. Altogether 45 specimens of *Seligeria*

and 93 specimens of *Calypogeia* were studied. Some specimens were sent to species' experts for verification.

RESULTS & DISCUSSION

Since the last additions (Vellak et al., 2021), four new species should be added to the list. One species (*Seligeria patula*) should be excluded from the list.

New species

CALYPOGEIA FISSA (L.) Raddi [lõhe-kottsammal]
Voucher specimen: TU161285, Saare Co., Lühimäe Comm., Viidumäe Nature Reserve, on the bank of a spring (58.27969° N; 22.10145° E), leg. N. Ingerpuu, 17 June 2014; det. N. Ingerpuu, 18 March 2020.

This species was first found in Estonia by E. Rozantseva at two different localities in 2021. Unfortunately, it had been formerly overlooked, since checking the earlier herbarium specimens of *Calypogeia muellerana* (Schiffn.) Müll.Frib. in TAA, TAM and TU, seven more specimens were identified as *C. fissa*. Since the most recent specimens were very small, a larger specimen that was collected in 2014, was designated as

the voucher specimen. In Europe, the species is evaluated as least concerned (LC). In our neighbouring countries, it is near threatened (NT) in Finland, endangered (EN) in Latvia, and it is also present in the European part of Russia (Hodgetts & Lockhart, 2020). The species grows in Estonia on decaying wood or on other bryophytes in moist and paludified forests, but also in fens. In Europe, it has suboceanic-mediterranean distribution (Damsholt, 2002). The species is known also from North America, North Africa and Asia (Potemkin, 2018).

Recently a related species, *Calypogeia paludosa* has been delimited according to plastid genome analyses (Šlipiko et al., 2020). This species should be searched for in the future since it lacks a contemporary morphological description yet and for now it is considered at variety level of *C. fissa* (Hodgetts et al., 2020).

HEDWIGIA EMODICA Hampe ex Müll.Hal. [valge lumilehik]

Voucher specimen: TU179153, Pärnu Co., Lääneranna Comm., Salevere village, Matsalu National Park, Salevere Salumägi, at the beginning of the hiking trail, on a granite stone, (58.690251° N; 23.580770° E), leg. M. Radvilavičius, 19 July 2018; det. T. Kupper, N. Ingerpuu, K. Vellak, L. Ehrlich, 15 March 2022.

Hedwigia emodica has been considered previously as *H. ciliata* var. *leucophaea* Bruch & Schimp. and was proven as a separate species on the basis of recent molecular studies (Ignatova et al., 2016). The occurrence of the variety in Estonia was published in 2015 (Vellak et al. 2015). In Estonian herbaria altogether, four specimens were labelled as *H. ciliata* var. *leucophaea*. During this study, two of them were re-identified as *H. ciliata* Hedw.) P.Beauv., but three more specimens were found among the specimens identified earlier as *H. ciliata*. At present, we have five specimens of *H. emodica* in Estonian herbaria, collected from three localities in the western part of Estonia. A new voucher specimen for *H. emodica*, the most representative among the specimens, has been designated here.

Hedwigia emodica grows on exposed rocks and seems to be favoured by cement dust (Hedenäs, 1994). The distribution range of this species is still unclear in Europe and therefore it has been

evaluated as DD in several countries of Europe (Hodgetts & Lockhart, 2020).

SYNTRICHIA RURALIFORMIS (Besch.) Mans [randkeerik]

Voucher specimen: TAM0104368, Hiiu Co., Hiiumaa Comm., island Hõralaid, juniper alvar on soil (58.90148° N; 23.06491° E), leg. L. Ehrlich, 09 July 2003; det. L. Ehrlich, 12 Sept 2003.

The species was known in Estonia since the beginning of the last century, but meanwhile treated as a variety (*Syntrichia ruralis* var. *ruraliformis* (Besch.) Delogne). Over the years the treatment of the taxa in *Syntrichia ruralis*-complex has been debated. Recent molecular and morphological studies suggest *S. ruraliformis* to be a distinct species rather than a variety of *S. ruralis* (Hedw.) F.Weber & D.Mohr (Hedenäs et al., 2019). *S. ruraliformis* is common in Europe, occurs in North America, North Africa and in Asia (Gallego et al., 2002). *Syntrichia ruraliformis* typically occurs in open dry habitats on sand or sandy soil, occasionally found on stony or rocky ground, on thin soil overlying rocks and concrete (Hallingbäck et al., 2008; Blockeel et al., 2014). The species is quite frequent in Western Estonia having numerous localities on islands, as well as on the mainland, the most eastward locality is in Rapla County. The species is evaluated as least concerned (LC) in Europe. In Estonia *S. ruraliformis* grows in a large variety of exposed habitats, but usually on sand, on sandy or shingled soil, and also on stones.

TIMMIA AUSTRIACA Hedw. [austria timmia]

Voucher specimen: TU174091, Harju Co., Jõelähtme Comm., Haapse village. Valkla Clint Protected Area, on the sandstone escarpment, (59.490885° N; 25.30584° E), leg. K. Vellak, 05 May 2021; det. K. Vellak, N. Ingerpuu, 6 Aug 2021, ver. C. Berg, 7 Oct 2021. Duplicate in GZU.

Timmia austriaca is widely distributed in forests of boreal region in Northern hemisphere, preferring rather basic or neutral substrates (Frey et al., 2006). When evaluated after the IUCN criteria it is considered as least concern (LC) in the whole Europe, but in several South European countries it is evaluated as threatened (Hodgetts et al., 2020). In the Baltic region, it is recorded only from Estonia and has only a single locality so far.

Excluded species

SELIGERIA PATULA (Lindb.) I. Hagen was announced as a new species for Estonian bryoflora in 2001. The specimen collected from Väike-Pakri island was first identified by L. Kannukene as *S. calcarea* (Hedw.) Bruch & Schimp. in 1994 (TAM0076942). In 1997 R. Ochyra identified it as *S. patula* (Vellak et al., 2001). Since the species was considered to be endemic to Europe (ECCB 1995), it was taken under the state protection in Estonia in 2004 and was included to the state monitor program since 2008. In course of the following monitoring events in 2014 and 2019, we encountered difficulties to re-find the species and thus in 2019 all suspected specimens together with the one collected in 1994 (TAM0076942) were sent for checking to R. Ochyra. None of the specimens were identified as *S. patula*. In 2020 an inventory of the genus *Seligeria* was conducted in all known localities in Estonia, including the locality formerly known as the habitat for *S. patula*. Some doubtful specimens were again sent for validating to R. Ochyra, but he did not find *S. patula* among them. As there are no proved specimens of this species collected from Estonian territory, the species should be excluded from the list of Estonian bryophytes, and from the list of protected species of Estonia.

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