

The mycological collection of G. C. Girgensohn from the middle of the 19th century

Kadri Pärtel,^{1,2} Ave Suija^{1,3} & Iryna Yatsiuk¹

¹Institute of Ecology and Earth Sciences, University of Tartu, J. Liivi St. 2, 50409, Tartu, Estonia

²Mycological Collections, Institute of Agriculture and Environmental Sciences, Estonian University of Life Sciences, Kreutzwaldi St. 5, 51006, Tartu, Estonia

³Natural History Museum and Botanical Garden, University of Tartu, Vanemuise St. 46, 51014, Tartu, Estonia.
E-mails: kadri.partel@ut.ee; ave.suija@ut.ee; iryna.yatsiuk@ut.ee.

Abstract: Since 1844, vouchers of mycological specimens collected from the territory of the historic Baltic provinces of the Russian Empire have been preserved in Estonian natural history collections. A pedagogue and an amateur bryologist, Gustav Carl Girgensohn (1786–1872) compiled a collection of 109 specimens of fungi and myxomycetes sampled from the Livonian Governorate, mostly from the vicinity of Tartu, in years 1844–1859. Girgensohn's collection, which is kept in the fungarium of the Estonian University of Life Sciences, is introduced here for the first time. Among his specimens there are two notable ascomycetes – coprophilous *Poronia punctata* (Xylariaceae, Sordariomycetes), recently evaluated in Estonia as Critically Endangered according to IUCN criteria, and *Microstoma protractum* (Sarcoscyphaceae, Pezizomycetes), recently evaluated as Endangered. The collection's eleven quite well-preserved specimens of myxomycetes represent six species, the least common of which is *Diderma radiatum*. In addition, the article introduces nine lichen specimens and one fungal specimen from Girgensohn's bryophyte collection at the Natural History Museum of the University of Tartu. The most remarkable species among this collection is *Lobaria pulmonaria* (Lobariaceae, Lecanoromycetes), red-listed and protected in many countries.

Kokkuvõte: Vanimad Eesti loodusteaduslikes kogudes säilitatavad seeneksemplarid pärinevad 1844 a., mil tänapäevane Eesti territoorium kuulus tollase Tsaari-Venemaa Balti provintsi Liivimaa kubermangu. Gustav Carl Girgensohn (1786–1872), pedagoog ja väljapaistev amatöör-brüoloog, kogus seeni, sealhulgas ka samblikke moodustavaid seeni, ja limakuid veidi enne Heinrich August Dietrichit, keda tuntakse kui esimest Baltimaade krüptogaamide uurijat. Artiklis tutvustame Girgensohni 109-st eksemplari koosnevat seenekogu, mis on koostatud 1844–1859 ja mida talletakse Eesti Maaülikooli fungariumis. Enamik materjalist on kogutud Tartu ümbrusest. Girgensohni seenekogu põnevaimad leiud on kriitilises seisundis liik (IUCN kategooria CR) liik täpiline jalgnööbik *Poronia punctata* (Xylariaceae, Sordariomycetes) ning väljasuremisohus (EN) lehterkarikseen *Microstoma protractum* (Sarcoscyphaceae, Pezizomycetes), mis on varaseimad tõendid nende Punase nimestiku liikide esinemistest Eestis. Materjali hulgas on ka üksikeid limakute küllalt hästi säilinud eksemplari, mis kuuluvad kuude liiki, haruldasim neist on *Diderma radiatum*. Peale selle tutvustatakse Tartu Ülikooli Loodusmuuseumi Girgensohni samblakogus talletatavat kümmet seeneksemplari, millest üheksa on lihheniseerunud seened. Neist märkimisväärseim on paljudes riikides Punasesse Raamatusse kuuluv või kaitsealune harilik kopsusamblik *Lobaria pulmonaria* (Lobariaceae, Lecanoromycetes).

Keywords: endangered species, Estonian Naturalists' Society, fungi, historical voucher specimens, lichenized fungi, Livonia, myxomycetes, taxon occurrences, TAAM, TU

INTRODUCTION

In 2020, we revised one of the oldest Estonian mycological collections compiled by Heinrich August Dietrich (1820–1897) including exciccatae series, *Centuria Plantarum Florae Balticae cryptogamarum* (Pärtel et al., 2021). While inspecting additional historical material kept in Tartu (Estonia), we discovered some yet neglected specimens of myxomycetes and fungi. It turned out that these specimens certainly have not collected by H. A. Dietrich. Our effort to establish the authorship of this old, anonymous fungal collection lead us to a distinguished amateur bryologist, G. C. Girgensohn who apparently was a close

friend of H. A. Dietrich. This finding allows us to add a short new paragraph to the history of Estonian mycology by introducing this forgotten collection to the wide mycological community.

Gustav Carl Girgensohn, a pedagogue and dedicated naturalist

Gustav Carl (alternatively Karl) Girgensohn (Fig. 1) was born on 23 March 1786 in Ergli (*Erlaa*, now in Latvia) in the Imperial Russian Baltic province, Livonian Governorate. He studied law at the University of Tartu (*Dorpat*) starting in 1803, and in 1807, he began his career as a teacher in Cēsis (*Wenden*, in present-day Latvia) and

later in Vyborg (*Wiborg*, in present-day Leningrad oblast, Russia) gymnasium. From 1814 to 1839, he was a head teacher in the Tartu Gymnasium and for some time (1823–1827) also in the Tartu Girls' School (Gottzmann & Hörner, 2007). From 1832–1841, he was the director of a private school (Liim, 1998). According to the rules of Imperial Russia, he received the title *Hofrat* (Court councilor) after 25 years as a civil servant (Gottzmann & Hörner, 2007; BBLD, 2021). From that point on, he probably had more time for his scientific interests.



Fig. 1. Oil painting of Gustav Carl Girgensohn in 1883 by Julie Hagen-Schwarz in a private collection. The reproduction from an exhibition catalogue (Anonymous, 1990).

From 1854, the name “*Gustav Karl Girgensohn, Hofrath, emeritirter Oberlehrer des Dorpater Gymnasiums*” is listed as a corresponding member of the Baltic German society *Die Dorpater Naturforscher-Gesellschaft* (Correspondirende Mitglieder, 1854), which later developed into the Estonian Naturalists' Society. An active member of this society, Alexander von Bunge (1803–1890), professor of botany, encouraged Girgensohn's bryological studies (Ingerpuu & Vellak, 2007), and the *Dorpater Naturforscher-*

Gesellschaft financed his collecting activity in 1854–1855 (Kongo, 1975: 147). He made several collecting trips, mainly in the area surrounding Tartu, Estonia (*Dorpat Kreis, Livland*) as well as in the Daugava and Gauja River (*Düna and Livländischer Aa*) valleys and some parts of Courland (*Kurland*), which are now located in Latvia. As a result of these expeditions, the first list of mosses and liverworts of the Baltic provinces was published quickly (Girgensohn, 1855), and in five years, a book was already issued with more than 300 moss and 50 liverwort descriptions (Girgensohn, 1860). His highest achievement was the Demidov Prize of the Russian Academy of Sciences of St. Petersburg, given in 1861 (BBLD 2021; The general review, 1866) for his bryological monograph (Girgensohn 1860). Gustav Carl Girgensohn died on 8 February 1872 in Tartu and was buried in Raadi Vana-Jaani cemetery (*der alte St. Johannisfriedhof*).

Girgensohn's main legacy in the Estonian and Latvian natural sciences are his bryophyte collections, consisting of approximately 3000 specimens deposited in different herbaria. A comprehensive overview of these collections is given by Ingerpuu & Vellak (2007). According to the open data of the Estonian natural history collections (PlutoF platform; Abarenkov et al., 2010), nearly 1400 plant specimens collected by Girgensohn are kept today in three Estonian herbaria (TU, TAA and TAM); however, the databasing process is continuous.

MATERIALS AND METHODS

Girgensohn's fungal collection is kept in TAAM (Estonian University of Life Sciences). Ten fungal specimens, including nine lichenized, are deposited in Girgensohn's bryophyte collection (TU-Girg) in TU (herbarium of the Natural History Museum of the University of Tartu). All vouchers were visually inspected under a stereomicroscope. When necessary, specimens were rehydrated in a 3% aqueous solution of potassium hydroxide (KOH), and microstructures were studied using razor-blade-cut sections mounted in a 3% solution of KOH and in Melzer's solution. The microscopical structures were measured in 3% KOH. Slides of myxomycetes' microstructures were produced with lactophenol cotton blue (LCB) or tap water as mounting media. Microphotos were taken using a Nikon 80i microscope. Occurrences were georeferenced



Fig. 2. Example of Girgensohn's collection, sheet no. 24. A: a) *Pilze, am faulende am Boden liegende Baumstamm im feuchten gebüsch bei Ratheshof* [Fungus on the rotting tree trunk lying on the ground near Raadi, Tartu], d. 7 April 1848 – unidentified discomycetes; b) *Im Laubwald, Annenhof gegenüber* [In deciduous forest opposite of Annemõisa, Tartu], d. 10 Mai 1853 – *Microstoma protractum*; c) unidentified agaric; B (in the red frame): herbarium label written by Girgensohn, no. 119 from *Musci frondosi et Hepaticae exsiccatae*, TU171695.

using the map compiled by Rücker (1890), the Place Names Database (KNAB, 2001–2020), the German-Estonian place name list (Kongo, 2016) and the Estonian Manors' Portal (Estonian Manors, 1999–2015). To ensure the concordance of toponyms in the text, we added historical names used by Baltic Germans in brackets after the current names in Estonian or Latvian, when first mentioned: e.g., Raadi Manor (*Rathshof*).

RESULTS & DISCUSSION

Girgensohn's hidden mycological specimens

Fifty-six historical paper sheets of unknown origin were given to Erast Parmasto (1928–2012), Professor of Mycology. Most of the labels on these sheets were quite precise, including locations and dates of collection (Fig. 2A).

The specimens of this collection were adhered to thin paper strips as in plant herbaria, with up to eight items per sheet. At first, these specimens were attributed to H. A. Dietrich because the collecting years (1844–1859) nearly matched the period of Dietrich's mycological activity (ca 1845–1861). However, when comparing handwriting on archival documents signed by Dietrich (National Archives of Estonia, EAA.29.3.5543), we found that his handwriting did not coincide with that on the labels of the

anonymous collection. Also, the study area according to the labels was the surroundings of Tartu (60 specimens) and a wider range in the Livonian governorate, while the localities reported in Dietrich's *Cryptogamenwelt* (Dietrich, 1856; 1859) were exclusively in the Estonian governorate (Fig. 3). Coincidentally, we received an autograph of G. C. Girgensohn in a letter to a professor at the University of Tartu, Johann Karl Simon Morgenstern (1770–1852) (Girgensohn, 1814), and we noticed a remarkable similarity to the handwriting on the labels in the bryophyte collection (see Fig. 2B). In addition, some specific collecting localities in his monograph (Girgensohn, 1860) (e.g., *Griwing-Mühle bei Wolmar* p. 81, *Wehje-uppe* p. 255, *Eglekrug zwischen Walk und Wolmar* p. 57) were repeated on the labels. Thus, the authorship of this anonymous mycological material was established.

There is evidence of an acquaintance between Girgensohn and Dietrich – in their books, it was clear that both acknowledged each other. Girgensohn (1860: 168) added to a moss description, “*Ein Phascum, welches Hr. A. Dietrich bei Heimar in Ehstland an feuchten Wegerändern gesammelt hat*”, while Dietrich has notes for some species, such as “*Häufiger in Dorpat's Umgebung*”, with Hofr. Girgensohn as the collector (Dietrich, 1856: 406, 407, 411,

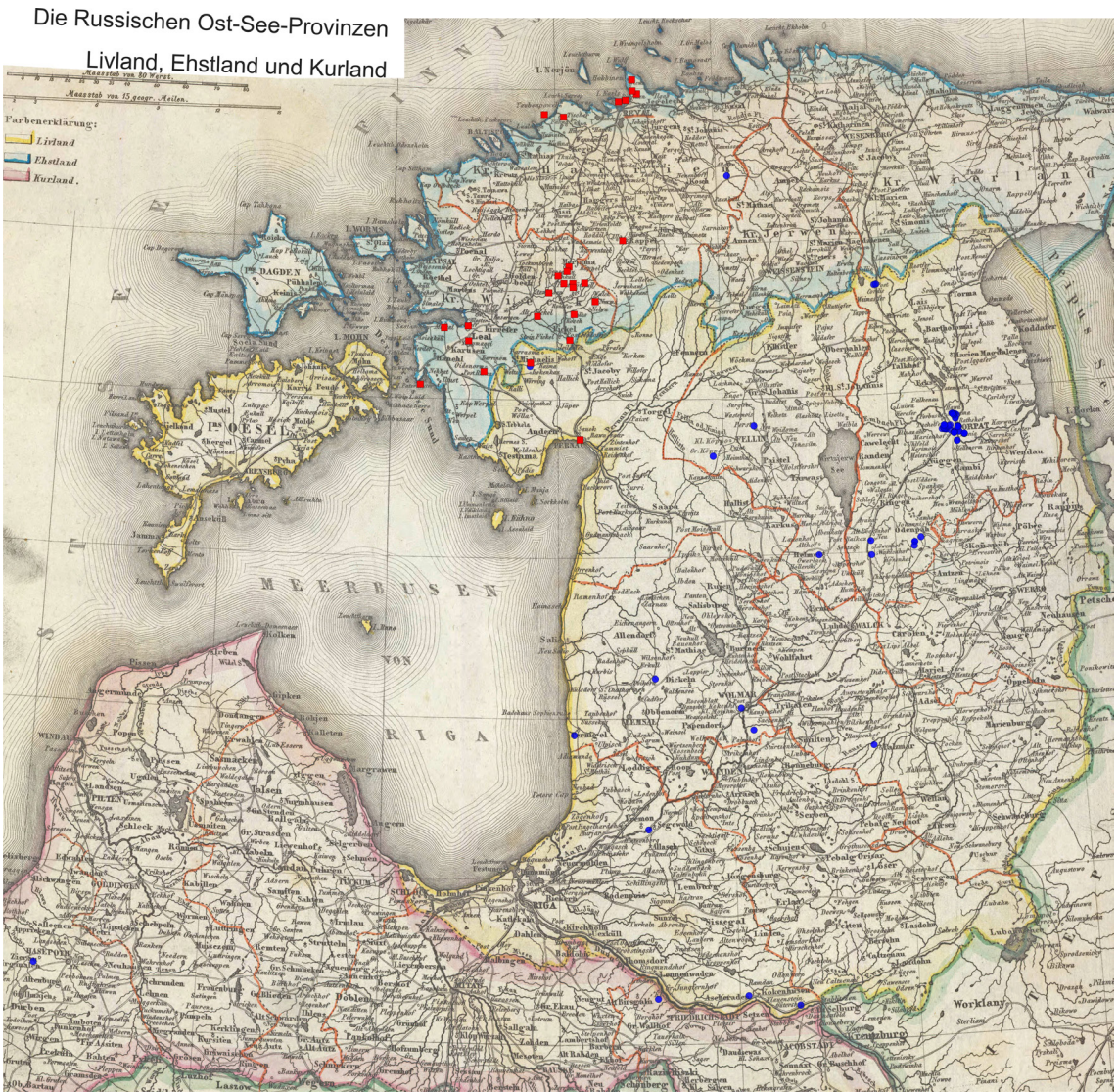


Fig. 3. Map of collecting sites of historical mycological specimens in Baltic provinces. Symbols: red rectangles, sites visited by H. A. Dietrich (based on information in Dietrich, 1856; 1859); blue circles, sites visited by G. C. Girgensohn (based on information on specimens' labels). The borders of Baltic Governorates are marked with the following colours: Estonia: blue, Livonia: yellow, Courland: rose. Original map: *Die Russischen Ost-See-Provinzen Livland, Ehstland und Kurland*. Entworfen und gezeichnet von J. Grassl. Issleib sc. (Stahlstich, Druck und Verlag des Bibliographischen Instituts in Hildburghausen, 1860). Base map received from D. Rumsey Map Center at the Stanford University Library.

413; 1859: 521). The proposal of a new species name, *Peziza girgensohni* H. A. Dietr. (Dietrich, 1856: 368), reflects Dietrich's deep respect for Girgensohn. Girgensohn was already an experienced amateur scientist when Dietrich started his research activity, perhaps under his general tutorship – excluding mycological expertise. As far as we know, Girgensohn did not publish any mycological papers, and his fungal material was not structured. That corresponds with his own words¹ – he was dedicated to mosses.

Data on preserved fungi collected by G. C. Girgensohn

All 56 sheets of Girgensohn's collection in TAAM collection were photographed, and data of 115 specimens were entered into a database. Detailed information about localities, substrates/hosts and photos for all specimens can be found at the Estonian eBiodiversity portal and the PlutoF data management platform (Revised collections of G. C. Girgensohn, XIX century: fungi, myxomycetes, 2020). The collecting sites of 22 specimens are in present-day Latvia, in case of four specimens collecting locations remain unclear. The rest of the material (89 specimens) was collected in Estonia. All labels were written by Girgensohn, and we conclude that these specimens were collected by him². The exceptions are four specimens, in which the labels clearly indicate that these were given to him by A. von Bunge (one specimen in 1851), and Alexander von Schrenk (1816–1876), a geologist of the University of Tartu (one specimen in 1852). One person "Herr M. Fr. Schmidt"³ provided two specimens, in 1844 and 1854.

¹ "Flechten und Pilze habe ich zwar fortgesetzt gesammelt, aber nicht die Musse finden können sie gehörig zu untersuchen und zu ordnen. Auch fehlte es mir dazu an einem eigenem, für dieser Zweck genügenden Mikroskop" (Girgensohn, 1855: 12)

² Girgensohn (1860) has acknowledged for moss specimens „Prof. A. v. Bunge, Privatdoc. Dr. Friedr. Schmidt, Mag. Nik. v. Seidlitz und Pharmaceut Bienert" – these persons collaborated with Girgensohn

³ Friedrich Schmidt (1832–1908) was an active botanist in his Tartu period, who collected samples to send to Girgensohn, and later a distinguished geologist (Kongo, 1975). According to the specimen label data, Schmidt was only 12 years old when he collected the first of the fungi included in the collection.

From 115 specimens 90 were originally unidentified and two specimens were misidentified. One specimen turned out to be an entomological object, a mite, with Girgensohn's original identification as *Erineum roseum* Schultz (Fungi, *incertae sedis*). Five specimens were mosses, and apparently the fungi growing on them have disappeared over time.

Additionally, there were ten specimens (nine lichens and one fungus) deposited in Girgensohn's bryophyte collection in TU. This collection consists of four volumes of leather-bound books in which specimens are glued on sheets using paper sticks. Each sheet is equipped with handwritten labels with species names. Locality data are given for only three out of ten specimens, but quite accurate descriptions of the substrate or habitat are given for the rest.

LIST OF SPECIES

In the list we use current taxon names following Index Fungorum database (Index Fungorum, 2021), and if the Girgensohn's original determination is present, it is written in brackets.

Abbreviations: GCG = Gustav Carl Girgensohn, and G with numbers in brackets (e.g., G 1) refers to Girgensohn's original sheet number, AS = Ave Suija, IY = Irina Yatsiuk, KK = Kuulo Kalamees, KP = Kadri Pärtel.

Eumycetozoa

Eleven specimens were identified, which represent six species, two with original identification.

Arcyria denudata (L.) Wettst. (as *Cribraria purpurea* Schrad. det. GCG). Estonia, Tartu, Toomemägi, Garden of Morgenstern (*Dom, Morgensternscher Garten*), on an old trunk, 1853-10-02, leg. GCG, det. IY, TAAM210672 (G 51) (Fig. 4A).

Diderma radiatum (L.) Morgan. (as *Diderma globosum* Pers. det. GCG). Estonia, Tartu County, Vasula (*Wassule/Wassulascher Wald*, here and hereafter = the forest around Vasula Lake), on a decaying stump, 1851-09-29, leg. GCG, det. IY, TAAM210528 (G 1) (Fig. 4B).

Didymium melanospermum (Pers.) T. Macbr. Estonia, Tartu Co., Vasula, on *Rhytidiadelphus triquetrus* (Hedw.) Warnst., 1851-09-14, leg. GCG, det. IY, TAAM210548.2 (G 21_2).

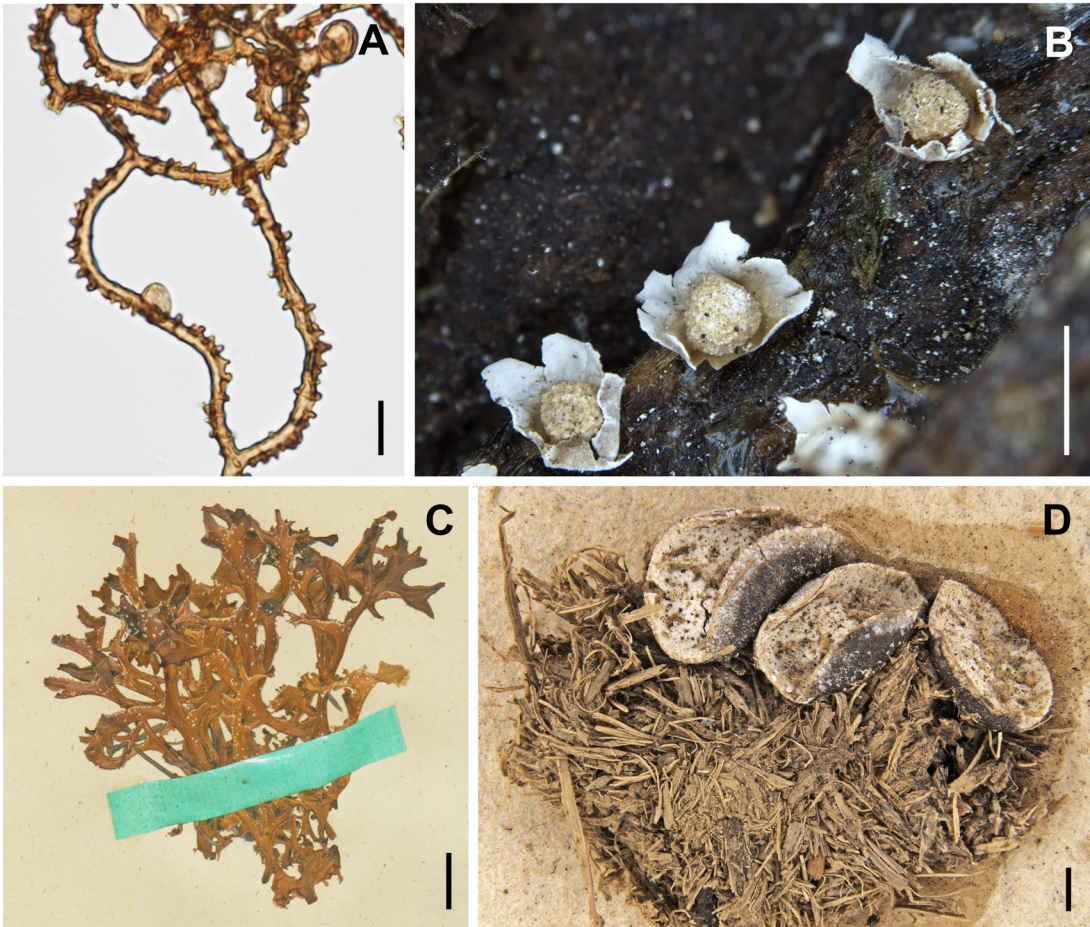


Fig. 4. Specimens in Girgensohn's collection. A–B Myxomycetes. A – *Arcyria denudata*, from Tartu “Dom, Morgensternscher Garten”, 1853, TAAM210672, capillitium with spores; B – *Diderma radiatum*, 1851, TAAM210528, fruitbodies; C – thallus of the lichenized fungus *Cetraria islandica*, TU173941; D – Sordariomycetes, stromata of *Poronia punctata* on dung, 1854, TAAM210658.6. Scale bars: A = 10 μ m, B, D = 1 mm, C = 10 mm.

Lycogala epidendrum (J. C. Buxb. ex L.) Fr. Estonia, Tartu Co., Vasula, on rotten wood, 1859-05-21, leg. GCG, det. IY, TAAM210658.5 (G 30_5); Tartu, Tähtvere (*Tehlefer*), on rotting trunk, 1850-09-03, leg. GCG, det. IY, TAAM210663 (G 35); Annemõisa (*Annenhoff*), on rotting stump, 1851-10-26, leg. GCG, det. IY, TAAM210664.7 (G 36_7); *idem*, on rotten wood, 1853-08-19, leg. GCG, det. KP, TAAM210614.2 (G 39_2).

Stemonitis axifera (Bull.) T. Macbr. Latvia, “Griwing-Mühle” in Valmiera surroundings, on bark of dry wood, 1855-06-21, leg. GCG, det. IY, TAAM210658.2 (G 30_2); Estonia,

locality data unspecified, 1852, leg. A. G. von Schrenk, det. IY, TAAM210664.8 (G 36_8).

Stemonitis fusca Roth, Estonia, Tartu, Toomemägi, Garden of Morgenstern, on old trunk, 1853-10-02, leg. GCG, det. IY, TAAM210673.a (G 52_a).

Stemonitis cf. fusca Roth, Estonia, Tartu Co., Vasula, on old trunk, 1853-05-21, leg. GCG, det. IY, TAAM210673.b (G 52_b).

Fungi

Fourteen unidentified specimens from the studied collection were too rotten or poor for any further investigations.

Mucoromycota

The list includes only one specimen.

Syzygites megalocarpus Ehrenb. Estonia, Viljandi Co., Pärsti (*Persth*), on old agaric fruitbodies, 1853, leg. & det. GCG, TAAM210544.2 (G 17_2). Very rotten specimen.

Ascomycota

The list includes 26 specimens (17 from TAAM and nine from TU), which represent 21 taxa identified at least to genus level (see the list below). For three specimens, the identification was possible only in order or higher level (data not shown).

- Anaptychia ciliaris* (L.) Körb. (as *Parmelia ciliaris* Ach.). Locality not given, on bark of many trees, leg. & det. GCG, conf. AS, TU173942 (G 207).
- Baeomyces rufus* (Huds.) Rebert. (as *Baeomyces rupestris* Pers.). Estonia, near Pühajärve, by the ditch (*ad fossum viae glareosam in sylva milliarium c. prope ps. Heiligensee*), leg. & det. GCG, conf. AS, TU173937 (G 202).
- Chaenotheca furfuracea* (L.) Tibell (as *Coniocybe furfuracea* Ach.). Estonia, Harju Co., c. 7.5 km from Paunküla to Jäneda (*7 Werst von Pannküll nach Jende*), on rotting wood, 1855-05-24, leg. & det. GCG, conf. AS, TAAM210541 (G 14).
- Cetraria islandica* (L.) Ach. Locality not given, on ground in dry forests, leg. & det. GCG, conf. AS, TU173941 (G 206) (Fig. 4C).
- Cladonia cervicornis* subsp. *verticillata* (Hoffm.) Ahti (as *Cladonia verticillata* Schaer.). Estonia, Tartu Co., in bog near Ropka (*in palude turfosa infra pr. Ropkoy*), leg. & det. GCG, conf. AS, TU173943 (G 208).
- Cladonia stygia* (Fr.) Ruoss (as *Cladonia rangiferina* Ach. det. GCG). Locality not given, most abundantly in dry and sandy forests, leg. GCG, det. AS & P. Löhmus, TU173944 (G 155).
- Encoelia furfuracea* (Roth) P. Karst. Estonia, Valga Co., Pühajärve (*Heiligensee*), in park, on *Alnus* trunk, on bark, 1854-05-23, leg. GCG, det. KP, with co-occurring *Graphis scripta* (L.) Ach., det. AS, TAAM210660 (G 32).
- Gyromitra esculenta* (Pers.) Fr. Estonia, Tartu, Tähtvere, 1854-05-09, leg. GCG, det. KP, TAAM210667 (G 42).
- Lobaria pulmonaria* (L.) Hoffm. (as *Sticta pulmonacea* Ach.). Locality not given, on old trees (*Quercus, Alnus*), leg. & det. GCG, conf. AS, TU173945 (G 156).
- Microstoma protractum* (Fr.) Kanouse. Estonia, Tartu, Annemõisa, 1853-05-10, leg. GCG, det. KP, TAAM210652.b (G 24_b) (Fig. 2A).
- Morchella conica* Pers. Estonia, Tartu, Toomemägi, on the ground under trees, 1854-05-04, leg. & det. GCG, conf. KP (*Morchella conica-elata* group), TAAM210530.a (G 4).
- Morchella esculenta* (L.) Pers. Estonia, Tartu, Toomemägi, on the ground under trees, 1854-05-04, leg. & det. GCG, conf. KP, TAAM210530.c (G 4).
- Nectria cinnabarina* (Tode) Fr. Estonia & Latvia, *Sorbus aucuparia* L., on dry twigs, 1848-03-27, leg. & det. GCG, conf. KP, TAAM210670.a (G 48_a); Estonia, Tartu, Raadi (*Rathshoff*), on deciduous twigs, 1851-04-04, leg. & det. GCG, TAAM210670.b (G 48_b); Annemõisa, on dry twigs, 1851-10-26, leg. & det. GCG, TAAM210670.c (G 48_c).
- Poronia punctata* (L.) Fr. Estonia, on dung of a herbivore, 1854, leg. Fr. Schmidt, det. KP, TAAM210658.6 (G 30_6) (Fig. 4D).
- Pseudevernia furfuracea* (L.) Zopf (as *Parmelia furfuracea* Ach.). Locality not given, on trunk and branches mainly on coniferous trees, leg. & det. GCG, conf. AS, TU173939 (G 204).
- Ramalina fraxinea* (L.) Ach. (as *Parmelia fraxinea* (L.) Ach.). Locality not given, grows on willows, aspens, rowans, abundant, leg. & det. GCG, conf. AS, TU173940 (G 205).
- Sarcoscypha austriaca* (O. Beck ex Sacc.) Boud. Estonia, Tartu Co., Vasula, 1851-05-14, leg. GCG, det. KP, TAAM210657.3 (G 29_3).
- Scutellinia* (Cooke) Lambotte. Latvia, Salacgrīva Municipality, Liepupe (*Pernigelscher Strand*), on the ground, 1851-07-07, leg. GCG, det. H. Tamm & KP, TAAM210657.6 (G 29_6).
- Trichoglossum* Boud., Estonia, Jõgeva maakond, Kärde (*Kardis*), among mosses, 1851-09-22, leg. A. von Bunge, det. KP & KK, TAAM210662.5 (G 34_5).
- Xanthoria parietina* (L.) Th. Fr. (as *Parmelia parietina* Ach.). Locality not given, on tree bark, almost everywhere, leg. & det. GSC, conf. AS, TU173938 (G 203).
- Xylaria hypoxylon* (L.) Grev. Estonia, Tartu, Annemõisa, on rotting stump, 1852-05-11, leg. & det. GCG, TAAM210664.6 (G 36_6).

Basidiomycota

The condition of 28 specimens of Agaricomycotina, including 23 with gills, was too bad for further examination due to the decaying process or absence of generative structures. Thirty-nine specimens were identified, which represent 35 taxa.

- Agaricus* L. Estonia, Tartu, Toomemägi, 1855-09-18, leg. GCG, det. KK, TAAM210677.1 (G 53_1).
- Amanita* Pers. Estonia, Tartu, Toomemägi, 1855-09-18, leg. GCG, det. KK, TAAM210677.2 (G 53_2).
- Clavulinopsis corniculata* (Schaeff.) Corner. Estonia, Tartu Co., Vasula, on rotting stumps, 1851-09-14, leg. & det. GCG, TAAM210664.2 (G 36_2).
- Coleosporium sonchi* Lév. (as *Puccinia suaveolens* (Pers.) Rostr. det. GCG). Estonia, Valga Co., Kuigatsi (*Postirung Kuikatz*), on leaves, 1853-06-07, leg. GCG, det. K. Pöldmaa TAAM210665.1 (G 37_1).
- Coltricia perennis* (L.) Murrill. Estonia & Latvia, 1854-06-07, leg. & det. GCG, conf. KK, TAAM210543.a (G 16_a); Estonia, Tartu, Tähtvere, 1853-08-31, leg. & det. GCG, conf. KK, TAAM210543.b (G 16_b); Latvia, Smiltene Municipality, between Valmiera and Valka, E of Strenči, "*bei Eggle Krug*", 1851-06-11, leg. GCG, det. KP, TAAM210661.2 (G 33_2).
- Connopus acervatus* (Fr.) K. W. Hughes, Mather & R. H. Petersen. Estonia, the vicinity of Tartu, on a tree, 1850-09-02, leg. GCG, det. KK, TAAM21053 (G 5).
- Coprinellus disseminatus* (Pers.) J. E. Lange. Estonia, Tartu, the vicinity of Raadi manor, on rotting wood, 1851-05-21, leg. & det. GCG, TAAM210675.b (G 49_b).
- Coprinus* Pers. sensu lato, Estonia, Tartu Co., Vasula, 1851-09-14, leg. GCG, det. KK, TAAM210662.7 (G 34_7).
- Cyathus olla* (Batsch) Pers. Estonia, Tartu, Botanical Garden of Tartu university, in flower pot, 1851, leg. & det. GCG, conf. KK, TAAM210662.6 (G 34_6).
- Cytidia salicina* (Fr.) Burt. Latvia, Aizpute Municipality, Cīrava (*Zierau*), on wood used for building a bridge, 1856-06-28, leg. GCG, det. KP, TAAM210658.3 (G 30_3).
- Entoloma* (Fr.) P. Kumm. Estonia, Valga Co., surroundings of Helme (*Helmet*), on the ground, 1851-07-12, leg. GCG, det. KK, TAAM210657.5 (G 29_5).
- Entolomataceae (as *Agaricus fumosus* Pers. det. GCG). Estonia & Latvia, locality data absent, 1852-09-25, leg. GCG, det. KK, TAAM210534 (G 7). Basidiospores angular-ellipsoidal, 6–9 × 5–7 µm.
- Geastrum fornicatum* (Huds.) Hook. Estonia, Tartu Co., Vasula, on spruce roots, 1851-10, leg. & det. GCG, TAAM210664.3 (G 36_3). Identification confirmed in genus level by KP.
- Gymnosporangium clavariiforme* (Wulfen) DC. Estonia, Jõgeva Co., Kärde, *Juniperus*, on bark of twigs, 1850-05-14, leg. & det. GCG, TAAM210669 (G 47).
- Inocutis rheades* (Pers.) Fiasson & Niemelä. Estonia, Tartu, Tähtvere, 1850-10-05, leg. GCG, det. I. Zettur, TAAM210612.a (G 41_a).
- Lentinus* cf. *ciliatus* (Fr.) Zmitr. Estonia, "*Köpposcher Urwald*" (probably Kõpu in Viljandi Co.), 1844-05, leg. Fr. Schmidt, det. KP, TAAM210614.1 (G 39_1).
- Lichenomphalia umbellifera* (L.) Redhead, Lutzoni, Moncalvo & Vilgalys. Estonia, Pärnu Co., Kõima, on peat-rich soil (*Torfgruben bei Kaima*), 1855-06-12, leg. & det. GCG, TAAM210546 (G 19).
- Lycoperdon* cf. *pyriforme* Schaeff. Estonia, Tartu, Ropka (*Ropkoy*), on rotting stumps, 1850-09-12, leg. GCG, det. KK, TAAM210539.a (G 12_a).
- Lycoperdon utriforme* (Bull.) Jaap. Estonia, "*Arro*" (Aru manor or Aruküla has many homonyms in different Estonian parishes), on dry twigs, 1852-08, leg. & det. GCG, conf. KP, TAAM210671 (G 50).
- Lycoperdon* Pers. Estonia, Tartu Co., Vasula, 1851-10, leg. GCG, det. KK, TAAM210657 (G 29_4); Tähtvere, 1853-08-31, leg. GCG, det. KK, TAAM210614.3 (G 39_3).
- Lycoperdon* Pers. (as *Lycoperdon gemmatum* β *perlatum* Fr.), Estonia, Tartu Co., in forest near Vasula, leg. GCG, conf. KP, TU173936 (G 201).
- Macrotyphula* R.H. Petersen. Estonia, Tartu Co., Vasula, on the ground on wood, decaying leaves, 1851-09-14, leg. GCG, det. KP, TAAM210664.1 (G 36_1).
- Merulius tremellosus* Schrad., Estonia, Tartu, Annemõisa, on rotting stumps, 1853-04-25, leg. GCG, det. KP, TAAM210666.1 (G 38_1).
- Mycena corticola* (Pers.) Gray, Estonia, Tartu, Raadi, on a rotting stump, 1850-09-29, leg. & det. GCG, TAAM210675.a (G 49_a).

- Phaeoclavulina flaccida* (Fr.) Giachini, Estonia, locality unspecified, 1851-09-23, leg. & det. GCG, TAAM210615 (G 46).
- Phellinus igniarius* (L.) Quél., Estonia, Valga Co., Pühajärve, in park, on a tree, 1854-05-23, leg. & det. GCG, TAAM210659 (G 31).
- Polyporus* P. Micheli ex Adans. sensu lato, Estonia, locality unspecified, on old stumps, 1851-08, leg. GCG, det. KP, TAAM210613 (G 45).
- Puccinia calcitrapae* DC. Estonia, locality unspecified, *Carduus crispus* L., on leaves, 1853-09, leg. GCG, det. K. Pöldmaa, TAAM210537 (G 10). Teliospores 2-celled, $34 \times 20\text{--}23 \mu\text{m}$.
- Puccinia suaveolens* (Pers.) Rostr. Estonia, Tallinn, Kadriori (Katharienthäl bei Reval), on leaves of *Cirsium arvense* var. *arvense* (L.) Scop. (det. T. Kukk), 1858-07-15, leg. GCG, det. KP, TAAM210651.2 (G 23_2).
- Stereum subtmentosum* Pouzar. Estonia, the vicinity of Tartu, on trees, 1850-09-02, leg. GCG, det. I. Zettur, TAAM210655.a (G 27_a).
- Stereum* Hill ex Pers., Estonia, Tartu, Raadi, on a fallen trunk, 1848-04-18, leg. GCG, det. KP, TAAM210549.c (G 22_c).
- cf. *Suillus bovinus* (Pers.) Kuntze. Estonia, Tartu, Tähtvere, 1853-08-31, leg. GCG, det. KK, TAAM210665.3 (G 37_3).
- Tapinella atrotomentosa* (Batsch) Šutara. Estonia, Tartu, Raadi, on a fallen trunk, 1848-04-18, leg. GCG, det. KK, TAAM210549.b (G 22_b).
- Thelephora terrestris* Ehrh. Estonia, Tartu, Jaamamõisa (*Jamascher Allee*), 1855-09-18, leg. GCG, det. U. Kõljalg, TAAM210658.1 (G 30_1); 1856-08-17, leg. GCG, det. U. Kõljalg, TAAM210658.7 (G 30_7).
- cf. *Tricholoma squarrulosum* (as *Tricholoma vaccinum* (Schaeff.) P. Kumm. det. GCG) Estonia, “an Obstbäumen”, 1850-09-04, leg. GCG, det. KK, TAAM210529 (G 2). Basidiospores broadly ellipsoidal, $6 \times 4 \mu\text{m}$.

The value of Girgensohn’s historical collections

The enthusiasm of early Baltic German natural scientists started in Tartu in the middle of 19th century in the society *Die Dorpater Naturforscher-Gesellschaft*, in which educated people from different occupations participated. As a result, besides their publications, we have the

physical base of their studies—their collections. It is beneficial for today’s researchers to revise collections using modern methods and apply modern taxonomic concepts to update data on species distribution and occurrences in certain regions. For example, the revision of the excicate of A. von Bunge revealed many plant taxa that are currently under protection (Kalda & Orav, 2014). While checking on the more than 160-year-old ascomycetes in Girgensohn’s collection, we found the oldest evidence of two Estonian red listed fungi. *Poronia punctata* (Xylariaceae, Sordariomycetes) ascostromas collected in 1854 were well-preserved in Girgensohn’s sheet 30. An IUCN assessment listed this species as *Critically Endangered* (Saar et al., 2019), last seen in 1960 in the Estonian Western islands (Pärtel et al., 2019). The most remarkable finding among lichenized fungi is *Lobaria pulmonaria* (Lobariaceae, Lecanoromycetes), however, it is not clear whether the specimen was collected from nowadays Estonia or Latvia. Nevertheless, the species is red-listed and / or protected in many countries (*Lobaria pulmonaria*, 2021), including Estonia (Lõhmus et al., 2019) and Latvia (Noteikumi ..., 2000).

The endangered early-spring fungus, *Microstoma protractum* (Sarcoscyphaceae, Pezizomycetes), also was included in the Girgensohn collection from Tartu in 1853.

Myxomycetes occurred only sporadically (11 specimens) in the collections of G. C. Girgensohn. Most of them were either unidentified or bore incorrect identifications, which suggests that this group was also outside of his research focus. Nevertheless, almost all of the specimens survived until the present time in good condition, and therefore were identified to a (morpho) species level. Among them are quite common species of myxomycetes, such as *Arcyria denudata*, *Stemonitis fusca* or *Lycogala epidendrum*; others, e.g. *Diderma radiatum*, are considered less common (*Diderma radiatum*, 2021).

Although mycological interest was occasional for G. C. Girgensohn, these hidden records of fungi and myxomycetes show the collector’s comprehensive interest in nature. While bryologists pointed out 16 rare species (in three or fewer localities) from present-day Estonia and/or Latvia from Girgensohn’s collections (Ingerpuu & Vellak 2007), we showed here that vouchers

of historical fungal samples complement the occurrence data of Estonian fungi, including currently endangered species.

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