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Research article

NEW RECORDS OF LICHENS AND LICHENICOLOUS FUNGI FROM KENYA AND TANZANIA (EAST AFRICA) 2

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Abstract: Collections of lichen-forming and lichenicolous fungi were studied from Kenya (2000, 2023) and Tanzania (1989, 1990) analysing the usual morphological, anatomical characters, as well as secondary chemistry by high performance thin-layer chromatography (HPTLC). Altogether 57 species of lichen-forming fungi and five species of lichenicolous fungi have been recognised in the investigated collections. The following 7 species of lichens, *Flavoparmelia pachydactyla* (Hale) Hale, *Hypogymnia subobscura* (Vain.) Poelt, *Hypotrachyna microblasta* (Vain.) Hale, *Montanelia disjuncta* (Erichsen) Divakar, A. Crespo, Wedin & Essl., *Parmotrema pilosum* (Stizenb.) Krog & Swinscow, *Usnea aristata* Mot. and *Xanthoparmelia phaeophana* (Stirton) Hale are new distribution records for Tanzania. Additionally, the species *Hypogymnia subobscura* (Vain.) Poelt is newly recorded for East Africa. The records of lichenicolous fungi presented from East Africa are the *Biatoropsis usnearum* Räsänen species complex, *Didymocyrtis melanelixiae* (Brackel) Diederich, R.C. Harris & Etayo, *Echinothecium hypogymniae* Zhurb. (new for East Africa), *Lichenoconium erodens* M.S. Christ. & D. Hawksw. and *Roselliniella africana* Diederich (new for Tanzania).

Keywords: distribution of species, floristics, lichen-forming fungi, lichen parasites, lichen secondary metabolites, new distribution records

INTRODUCTION

The knowledge on East African fruticose and foliose lichens is mostly based on "Macrolichens of East Africa" by Swinscow and Krog (1988). Most recently the lichen flora of Tanzania was reviewed by Temu and Tibuhwa (2024). Meanwhile Kanyungulu *et al.* (2025) compiled an annotated checklist of macrolichens of Kenya describing a tentative estimation of extinction risk of Data Deficient species. Further literature data on lichenicolous fungi can be found sporadically (e.g., Kondratyuk and Galloway 1995; Farkas and

Flakus 2016; Suija *et al.* 2018, Flakus *et al.* 2019; Farkas *et al.* 2023). Several new species were described (Suija *et al.* 2018; Zhurbenko 2021, 2022) from Kenya, Tanzania and Uganda from various hosts. In our recent publication we concentrated on the parmelioid taxa (Farkas and Muhoro 2022). Another publication listed data from former East African collections (Farkas *et al.* 2023). These were partly collected in the framework of the Usambara Rain Forest Research Project (in 1980s) with the cooperation of the Hungarian and the Royal Swedish Academies of Sciences, as well as the Sokoine Agricultural University, Dar es Salaam/Morogoro, Tanzania; and also during various other study trips during the professorship of Tamás Pócs in the Morogoro Campus (1985–1990). Small lichen fragments were also collected for educational purposes in Kenya recently by A. M. Muhoro (2020, 2021) and C. N. Kanyungulu (2023). 82 specimens of various morphological groups with lichenicolous fungi from the collections of Coretor Nyiva Kanyungulu (2023, Kenya) and Tamás Pócs (1989–1990, Tanzania) were studied recently by stereo and research microscopes and high performance thin layer chromatography (HPTLC). The purpose of the study was the identification of species to increase our knowledge on the distribution of lichen-forming and lichenicolous fungi in East Africa. The results of the most recently identified specimens are listed below.

MATERIALS AND METHODS

Morphology and anatomy of the thalli were studied using a Nikon Eclipse/NiU compound microscope and a Nikon SMZ18 stereo-microscope. Micrographs were prepared using a Nikon DS-Fi1c and Fi3 camera with NIS-Elements BR ML software. HPTLC analysis for studying lichen secondary metabolites was carried out according to standard methods by Arup *et al.* (1993) and Molnár and Farkas (2011). Specimens (82) are deposited in the Lichen Herbarium VBI (Vácrátót, Hungary).

RESULTS AND DISCUSSION

Checklist of the lichen-forming and lichenicolous fungi

Taxa are listed in alphabetical order. Lichenicolous fungi are indicated by #. New distribution data are indicated by * (for Tanzania), ** (for East Africa). The lichenised fungi were identified by E. Farkas and C. N. Kanyungulu, while lichenicolous fungi were identified by N. Varga in 2025. Locality data and the detected lichen secondary metabolites are given, distribution and some of the most important morphological / anatomical characters of the species are analysed according to available literature data, especially in the case of distributional novelties.

Anzia afromontana R. Sant.

Tanzania: Arusha Region, Meru District, Mt Meru, W slope, *Erica arborea* stand with *Senecio kilimanjari* and *Lobelia deckenii* in the N branch of Engare Narok valley at 3,150–3,250 m a.s.l., T. Pócs, 89186/AQ, 16.06.1989 (VBI 6253 – atranorin, divaricatic acid, 2 fatty acids).

It is known from all countries of East Africa, also found in South America. Saxicolous, corticolous, muscicolous, tiny decorative species, rare, but extending to montane–subalpine zone (1,800–above 4,000 m a.s.l.) (Frisch 1999; Frisch and Hertel 1998; Kirika *et al.* 2018; Swinscow and Krog 1988).

#***Biatoropsis usnearum*** Räsänen species complex

Tanzania: Arusha Region, Meru District, Mt Meru, SW slope, subalpine *Erica arborea* giant heath with many *Senecio kilimanjari*, *Myrsine, Rapanea*, *Dirsa stairsii* and *Swertia kilimanjarica* on the SW ridge of the main peak, on *Erica* at 2,700–3,100 m a.s.l., T. Pócs, Mnyonga & V. R. Nsolomo, 89194/M (on *Usnea aristata*, VBI 6338); Kilimanjaro Region, Rombo District, Kilimanjaro Mts, NE slope of Mawenzi, WSW of Tarakea village, N side of Nesikiria river, 4–6 m tall *Erica arborea* giant heath at 2,580–2,600 m a.s.l., T. Pócs with Mjhatta & J. Linden, 90022/M, 01.02.1990 (on *Parmotrema reticulatum,* VBI 6339).

Gall-forming lichenicolous fungi belonging to the Basidiomycota are difficult to identify due to their poor anatomical features. Although Diederich *et al.* (2022) summarised the existing knowledge and described species, materials from Africa were poorly investigated. The most accurate identification requires the use of molecular genetic methods, which are not available in our current work, and the age of the specimens also makes the application of this method questionable.

Biatoropsis usnearum was first described by Räsänen in 1934 on host species of the genus *Usnea*, as the type species of the genus *Biatoropsis*. According to our current knowledge, all members of this genus are lichenicolous and grow on *Usnea* and *Protousnea* hosts. Since no closer species identification was possible, indication as 'species complex' refers to that further investigation is required. The appearance of the galls on our material can vary, both in size and colour. Initially, we observed that the young forms were light brown (*Figure 1a–b*). Over time, these galls darkened, assuming a more rounded or oval shape with irregular, curving margins. Diederich *et al.* (2022) have noted that the numerous similar micro- and macromorphological characteristics of this genus suggest a distant phylogenetic position. Due to their similar and overlapping characteristics, many species have not been identified yet. Changes are expected in the future regarding the taxonomic status and number of species of *Biatoropsis* and related genera. This will allow further improvement of our current work. It will also contribute to the expansion of our knowledge of African lichenicolous fungi.

Bulbothrix kenyana Kirika, Divakar & Lumbsch

Tanzania: Manyara Region, Mbulu District, Mbulu Highlands, Guam Hills 4 km E of Mbulu town. Datlaa Hill, steep granite outcrop with huge cliffs and boulders, covered by secondary bush at 1,950–2,100 m a.s.l., T. Pócs & J. Linden, 90097/K, 01.06.1990 (VBI 6254 – atranorin, salazinic acid).

This rare, corticolous, saxicolous species was described from Kenya (Kirika *et al.* 2017) and found also in Tanzania (Farkas et al 2023). It grows in *Acacia / Commiphora* shrubland, secondary vegetation, dry thickets, forests (800–1,850 m a.s.l.) (Kirika *et al.* 2017; Farkas *et al.* 2023). The current record is from somewhat higher elevation (1,950–2,100 m a.s.l.).

Coccocarpia adnata Arv.

Tanzania: Morogoro Region, Kilosa District, Mamboya Hills, round granitic rock outcrop near Magubike along the Morogoro–Dodoma highway, *Xerophyta scabrida* (Velloziaceae) bush on the rock summit at 880 m a.s.l., T. Pócs & H. Krog, 89217/EB, 25.08.1989 (VBI 6255 – no lichen substances detected).

This rare corticolous, ramicolous species is known in East Africa from Kenya and Tanzania, also found in Mauritius, Indonesia and the Pacific Islands. It grows in dry sites and mangrove vegetation near sea level (Swinscow and Krog 1988; Alstrup and Christensen 2006).

The here reported specimen is from a dry site in higher elevation (880 m a.s.l.).

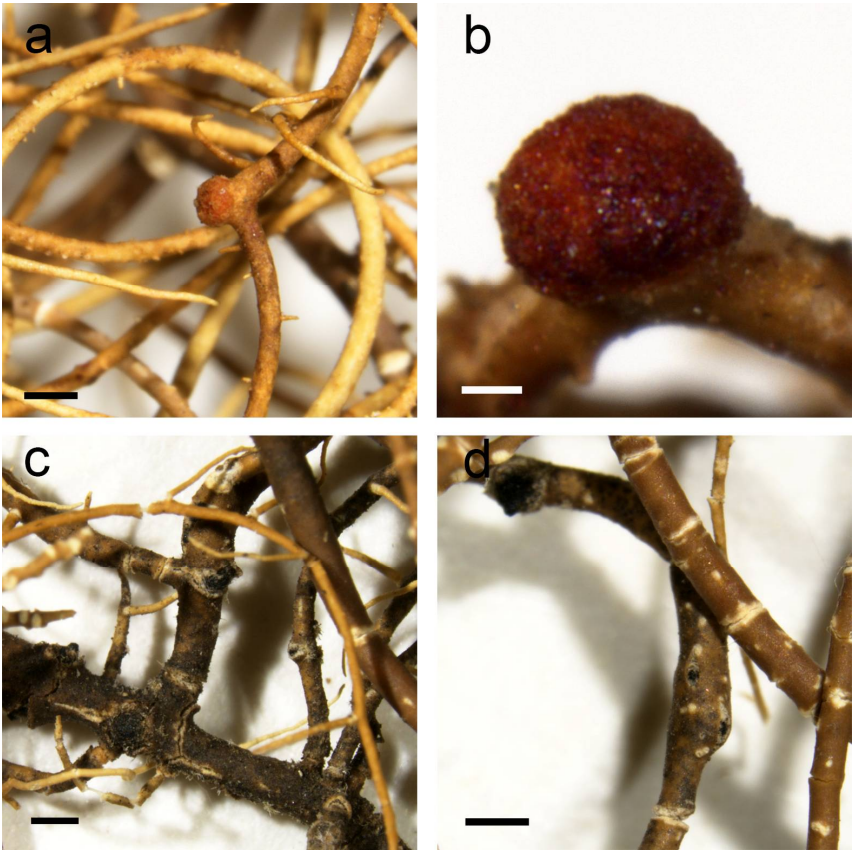

Figure 1. Lichenicolous fungi, **a–b**) *Biatoropsis usnearum* species complex, **c–d**) *Roselliniella africana*. Scale: a, c–d = 0.4 mm, b = 100 µm.

#***Didymocyrtis melanelixiae*** (Brackel) Diederich, R.C. Harris & Etayo
Kenya: Makueni County, Sultan Hamud, towards NW on Mombasa Road A109 near Africa Inland Church Bethel at Pendo Kindergarten, in arid savannah vegetation, on bark and twigs of *Acacia* sp. at 1,270 m a.s.l., 1°58'29.08"S; 37°20'15.84"E, C.N. Kanyungulu, 17.08.2023 (on *Parmotrema austrosinense*, VBI 6336).

The conidial stage was observed on necrotic circles on the host thalli. The conidia are similar in shape, but vary in size from 5–6.3 × 3.3–3.9 µm (length/width > 1.5), which is wider than the range described originally by Brackel (2011). However, Ertz *et al.* (2015)

measured slightly longer conidia [(3.5–)3.8–5.1(–6.2) × (2.8–)3.2–3.8(–4.3) μm].

The species is distributed across Europe, North America, South America, and the Indian Ocean and it occurs mainly on parmelioid lichens (Ertz *et al.* 2015). It has been found on the same host lichen species from Kenya (Farkas *et al.* 2023).

Dirinaria flava (Müll. Arg.) C. W. Dodge

Tanzania: Morogoro Region, Kilosa District, Mamboya Hills, round granitic rock outcrop near Magubike along the Morogoro–Dodoma highway, *Xerophyta scabrida* (Velloziaceae) bush on the rock summit at 880 m a.s.l., T. Pócs & H. Krog, 89217/AB, 25.08.1989 (VBI 6256 – atranorin, divaricatic acid (?), terpenoid, ochraceous pigment).

This rare, terricolous species is known in East Africa from Kenya and Tanzania, also found in Mozambique, and the Ascension Island. It grows in natural, open woodland, lava under shrubs, montane zone (1,000–1,700 m a.s.l.) (Swinscow and Krog 1988).

Dirinaria leopoldii (Stein) D. D. Awasthi

Tanzania: Morogoro Region, Kilosa District, Mamboya Hills, round granitic rock outcrop near Magubike along the Morogoro–Dodoma highway, *Xerophyta scabrida* (Velloziaceae) bush on the rock summit at 880 m a.s.l., T. Pócs & H. Krog, 89217/QQ, 25.08.1989 (VBI 6257 – no HPTLC analysis, medullary red pigment +).

This rare, ramicolous species is known in East Africa from Kenya and Tanzania, also found in western, central and southern Africa, furthermore in tropical and subtropical America. It is collected rarely, in shrubland (800–1,000 m a.s.l.) (Swinscow and Krog 1988). The current specimen was also found in a dry shrubland in Tanzania. Its conspicuous red pigment was observed in the medulla, the thallus is sorediate (*Figure 2a*).

Dirinaria picta (Sw.) Clem. & Shear

Tanzania: Morogoro Region, Kilosa District, Mamboya Hills, round granitic rock outcrop near Magubike along the Morogoro–Dodoma highway, *Xerophyta scabrida* (Velloziaceae) bush on the rock summit at 880 m a.s.l., T. Pócs & H. Krog, 89217/EC, 25.08.1989 (VBI 6258 – atranorin, divaricatic acid, terpenoids, fatty acid).

This common pantropical and subtropical ramicolous species is also known from all countries of East Africa. It grows in shrubland (0–2,000 m a.s.l.) (Swinscow and Krog 1988; Alstrup *et al.* 2010).

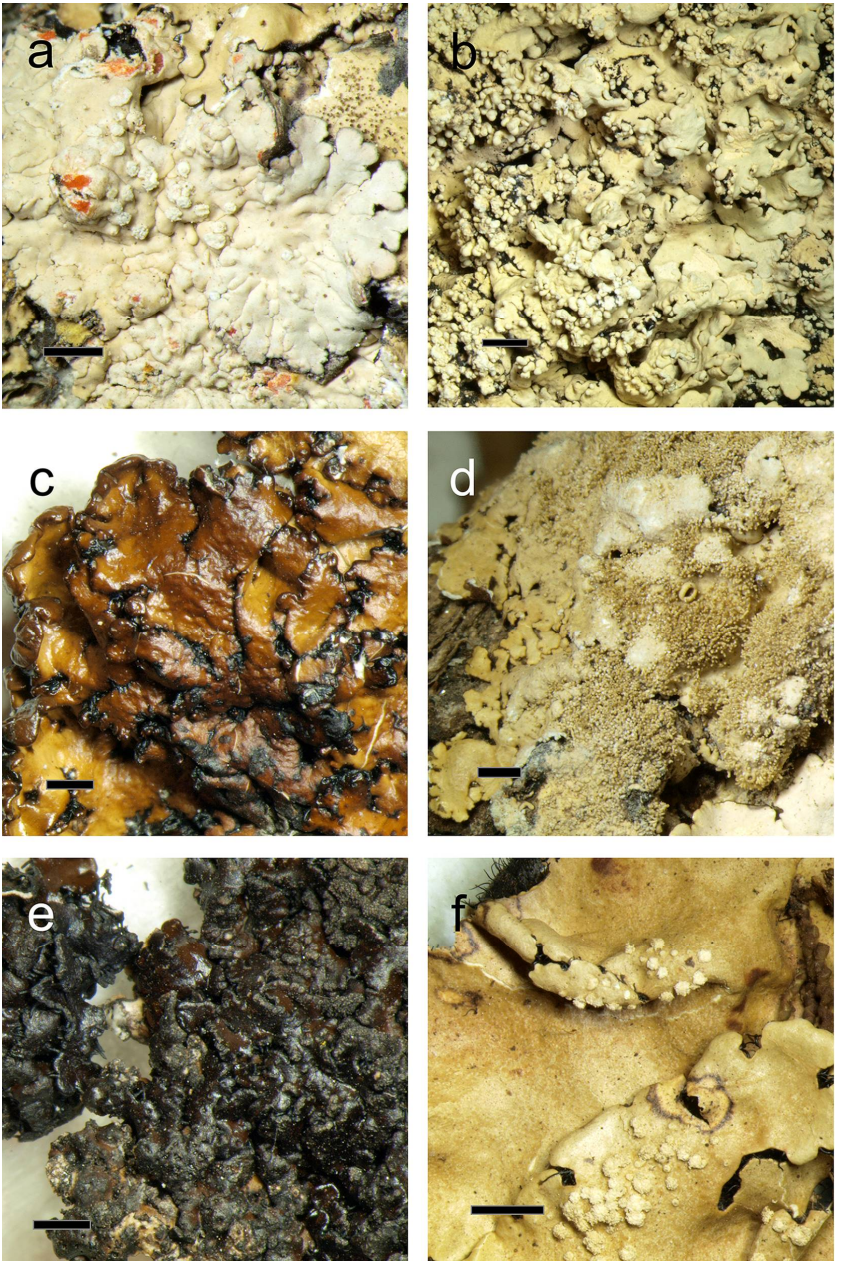

Figure 2. The thalli of lichen species, **a**) *Dirinaria leopoldii* with soredia and medullary red pigment, **b**) *Flavoparmelia pachydactyla*, **c**) *Hypogymnia subobscura*, **d**) *Hypotrachyna microblasta*, **e**) *Montanelia disjuncta*, **f**) *Parmotrema pilosum*. Scale: a–e = 1 mm, f = 2 mm.

#*Echinothecium hypogymniae* Zhurb.

Tanzania: Kilimanjaro Region, Siha District, Kilimanjaro Mts, Shira Plateau, at the campsite above S-Engare Nairobi gorge, many cliffs, lava caves and a small stand of *Senecio cottonii* (10–20 trees), saxicolous at 3,580 m a.s.l., T. Pócs & J. Linden, 90031/U, 17–18.02.1990 (on *Hypogymnia subobscura* VBI 6340).

Ascospores are hyaline to light brown, 11,5–13,5 × 4,2–5 µm. This size range is more similar to that of *Echinothecium hypogymniae*, described from *Hypogymnia bitteri* (Zhurbenko *et al.* 2019), than to that of *Echinothecium reticulatum* which has smaller ascospores (7–11 × 3,5–4,5 µm) and is reported from *Parmelia* s. str. (Brackel 2008; Chomnunti *et al.* 2011; Hafellner and Calatayud 1999; Halici and Barták 2019). This is the first record from Tanzania and the East African region.

Flavoparmelia caperata (L.) Hale

Tanzania: Kilimanjaro Region, Rombo District, Kilimanjaro Mts, NE slope of Mawenzi, WSW of Tarakea village, N side of Nesikiria river, 4–6 m tall *Erica arborea* giant heath at 2,580–2,600 m a.s.l., T. Pócs with Mjhatta & J. Linden, 90022/AB, 01.02.1990 (VBI 6259 – usnic acid, protocetraric acid, caperatic acid).

This cosmopolitan species, well known from the temperate region, also found in all countries of East Africa from higher elevations (1,500–3,600 m a.s.l.). It is also found in artificial habitats, well lit sites, montane to low alpine forests (Swinscow and Krog 1988; Kirika *et al.* 2018; Farkas *et al.* 2023, 2024).

Flavoparmelia pachydactyla (Hale) Hale

Tanzania: Manyara Region, Mbulu District, Mbulu Highlands, Guam Hills 4 km E of Mbulu town. Datlaa Hill, steep granite outcrop with huge cliffs and boulders, covered by secondary bush, saxicolous at 1,950–2,100 m a.s.l., T. Pócs & J. Linden, 90097/C, 01.06.1990 (VBI 6260 – usnic acid, protocetraric acid).

A very rare saxicolous species. Earlier known from Kenya and Rhodesia (Zimbabwe). It was found in exposed sites (1,750 m a.s.l.) (Hale 1972; Swinscow and Krog 1988). The current specimen – consisting of several thalli (*Figure 2b*) – was found in higher elevations up to 2,100 m a.s.l. as a new distribution record for Tanzania.

Flavoparmelia soredians (Nyl.) Hale

Kenya: Kajiado County, Ngong Hill Forest Recreational Park, between KenGen Ngong Wind Power Station and Ziplinning Ngong Hills on volcanic rock/tuff and in arid–semi-arid mixed wood vegetation, saxicolous and corticolous at c. 2,300 m a.s.l., 1°23'03.41"S; 36°38'18.39"E, C.N. Kanyungulu, 12.09.2023 (VBI 6261 – usnic acid, stictic acid, salazinic acid).

This common East African species is found in Kenya, Tanzania and Uganda. It is also known from Southern Africa, Europe, South America and New Zealand. It grows on various substrates (corticolous, lignicolous, saxicolous), also in artificial habitats, well lit sites, lower montane–lower alpine xerotropical upland, orotropical montane, orotropical bamboo, orotropical cloud forests (1,100–2,900 m a.s.l.) (Swinscow and Krog 1988; Kirika *et al.* 2018).

Heterodermia speciosa (Wulfen) Trevis.

Tanzania: Kilimanjaro Region, Siha District, Kilimanjaro Mts, NW slopes, at Larangwa, dry semi-evergreen forest dominated by *Teclea simplicifolia*, *Calodendrum capense*, *Olea africana*, corticolous at 1,700 m a.s.l., T. Pócs with Katigula, 90008/P, 19.01.1990 (VBI 6262 – atranorin, zeorin, terpenoids); Arusha Region, Longido (Maasai) District, Longido Hill above Longido village, dry evergreen forest on the S ridge, saxicolous at 1,900–2,000 m a.s.l., T. Pócs & V. R. Nsolomo, 89192/C, 16.06.1989 (VBI 6263 – atranorin, zeorin).

This common, cosmopolitan, corticolous (*Schinus molle*) and (saxicolous) species was known also from all countries of East Africa. It was found on sheltered sites, in both natural and artificial habitats (1,100–3,600 m a.s.l.) (Swinscow and Krog 1988; Czeczuga *et al.* 1992; Alstrup *et al.* 2010).

*****Hypogymnia subobscura*** (Vain.) Poelt

Tanzania: Kilimanjaro Region, Siha District, Kilimanjaro Mts, Shira Plateau, at the campsite above S-Engare Nairobi gorge, many cliffs, lava caves and a small stand of *Senecio cottonii* (10–20 trees), saxicolous at 3,580 m a.s.l., T. Pócs & J. Linden, 90031/U, 17–18.02.1990 (VBI 6264 – atranorin, oxyphysodic acid, protocetraric acid).

This saxicolous or terricolous species is better known from cooler regions of Europe (Poelt 1962; Hansen and McCune 2010) and North America (Goward *et al*. 2012; Brodo 2016). It is characterised by black mottling over the upper surface, a tendency to turn chestnut brown in high light, lobes (0.5-1.7 mm wide) often black bordered; lobe tips often sparsely perforate with a single small hole, medulla hollow; the cavity has a white medullary ceiling, and the frequent presence of laminal and or terminal lobules and subspherical isidia (*Figure 2c*). New distribution record for Tanzania (Kilimanjaro Mts, 3,580 m a.s.l.) and East Africa.

Hypotrachyna densirhizinata (Kurok.) Hale

Tanzania: Arusha Region, Meru District, Mt Meru, SW slope, subalpine *Erica arborea* giant heath with many *Senecio kilimanjari*, *Myrsine, Rapanea*, *Dirsa stairsii* and

Swertia kilimanjarica on the SW ridge of the main peak, corticolous at 2,700–3,100 m a.s.l., T. Pócs, Mnyonga & V. R. Nsolomo, 89194/RB, 21.06.1989 (VBI 6265 – atranorin, alectoronic acid).

This common species is known form all countries of East Africa and also occurs in Central and South America and West Indies. It is corticolous, lignicolous, muscicolous, humicolous / saxicolous. Grows in open sites in the upper montane–ericaceous zone (2,600–above 4,000 m a.s.l.) (Swinscow and Krog 1988; Frisch and Hertel 1998; Frisch 1999, Alstrup *et al.* 2010).

Hypotrachyna laevigata (Sm.) Hale

Tanzania: Arusha Region, Meru District, Mt Meru, W slope, *Erica arborea* stand with *Senecio kilimanjari* and *Lobelia deckenii* in the N branch of Engare Narok valley at 3,150–3,250 m a.s.l., T. Pócs, 89186/AN, 16.06.1989 (VBI 6266 – atranorin, barbatic acid, 4-O-demethyl barbatic acid).

This species is known from all countries of East Africa and is locally common. Also found in the Americas, Europe and New Zealand. It is muscicolous, corticolous, ramicolous. Grows in well-lit sites in the submontane–ericaceous–subalpine zone (1,600–3,400 m a.s.l.) (Swinscow and Krog 1988; Frisch and Hertel 1998; Frisch 1999).

****Hypotrachyna microblasta*** (Vain.) Hale

Tanzania: Morogoro Region, Kilosa District, Mamboya Hills, round granitic rock outcrop near Magubike along the Morogoro–Dodoma highway, *Xerophyta scabrida* (Velloziaceae) bush on the rock summit at 880 m a.s.l., T. Pócs & H. Krog, 89217/AA, QA, 25.08.1989 (VBI 6267, 6268 – atranorin, usnic acid, barbatic acid (?), (galbinic acid)).

In East African countries earlier known only from Kenya but is also known from tropical America, the West Indies and Southeast Asia. It is corticolous in lower montane forest (1,850–2,000 m a.s.l.) (Swinscow and Krog 1988). The current record is ramicolous on *Xerophyta scabrida* and found in a relatively low elevation at 800 m a.s.l. (*Figure 2d*). It represents a new distribution record for Tanzania.

Hypotrachyna orientalis (Hale) Hale

Tanzania: Arusha Region, Meru District, Mt Meru, SW slope, subalpine *Erica arborea* giant heath with many *Senecio kilimanjari*, *Myrsine, Rapanea*, *Dirsa stairsii* and *Swertia kilimanjarica* on the SW ridge of the main peak, on *Erica* at 2,700–3,100 m a.s.l., T. Pócs, Mnyonga & V. R. Nsolomo, 89194/APA, APB, M, BBA, BBB, 21.06.1989 (VBI 6269–6273 – atranorin, barbatic acid, 4-O-demethyl barbatic acid).

This common species is known from all East African countries, furthermore found in Asia. It is corticolous, ramicolous, lignicolous, muscicolous, saxicolous in ericaceous, montane–alpine forests (2,000–4,100 m a.s.l.) (Swinscow and Krog 1988; Frisch and Hertel 1998; Frisch 1999; Alstrup *et al.* 2010).

Hypotrachyna sorocheila (Vain.) Divakar, A. Crespo, Sipman, Elix & Lumbsch

Tanzania: Kilimanjaro Region, Moshi Rural District, Kilimanjaro Mts, Marangu Route, gorge with *Senecios* below Horombo Hut at 3,750–3,800 m a.s.l., T. Pócs & S. Orbán, 89149/U, 20.05.1989 (VBI 6274 – atranorin, salazinic acid).

This common species is known form all East African countries, found also in South America, Madeira, Asia (Indian Himalaya only), New Zealand. It is corticolous, ramicolous, (terricolous/saxicolous), muscicolous, humicolous in montane–ericaceous–lower alpine zone (2,000–above 4,000 m a.s.l.) (Swinscow and Krog 1988; Frisch and Hertel 1998; Frisch 1999; Kirika *et al.* 2016a).

Hypotrachyna vexans (Zahlbr. ex W.L. Culb. & C.F. Culb.) Divakar, A. Crespo, Sipman, Elix & Lumbsch

Tanzania: Kilimanjaro Region, Siha District, Kilimanjaro Mts, Shira Plateau, near the campsite above Engare Nairobi gorge, alpine semidesert tussock and *Philippia* bush, saxicolous at 3,550 m a.s.l., T. Pócs with K. Pócs & J. Linden, 90030/U, 17.02.1990 (VBI 6275 – atranorin, salazinic acid).

In East African countries it is found in Kenya and Tanzania. It is also known from Central and South America and Asia. It is a locally common, corticolous species, known to grow in lower montane forest (1,800–2,100 m a.s.l.) (Swinscow and Krog 1988; Alstrup *et al.* 2010; Kirika *et al.* 2016). The current record is saxicolous in high elevation (3,550 m a.s.l.) of Kilimanjaro Mts.

#***Lichenoconium erodens*** M.S. Christ. & D. Hawksw.

Tanzania: Ngorongoro Conservation Area, NE rim, inner slope NW of Oljoro Nyuki, mature, mist effected but heavily grazed *Acacia lahai* stand, very rich in epiphytes, ramicolous at 2,220 m a.s.l., T. Pócs, A. Kijazi & P. Murphy, 89011/B, 09.01.1989 (on *Parmotrema subschimperi*, VBI 6337).

This highly pathogenic, conidial fungus was observed on necrotic spots with black margin on the host thalli as well as on the soredia. Overmatured conidia are spread around the ostiolar region of the pycnidia, giving the surface a dark brown colour. It is widespread and grows on various lichen hosts (Hawksworth 1977; Darmostuk 2019). *Parmotrema subschimperi* is a new host lichen. This parasite

has been recorded in Kenya and Tanzania from other species of *Parmotrema* (Farkas *et al.* 2023).

****Montanelia disjuncta*** (Erichsen) Divakar, A. Crespo, Wedin & Essl.
Tanzania: Kilimanjaro Region, Siha District, Kilimanjaro Mts, Shira Plateau, at the campsite above S-Engare Nairobi gorge, many cliffs, lava caves and a small stand of *Senecio cottonii* (10–20 trees), saxicolous at 3,580 m a.s.l., T. Pócs & J. Linden, 90031/O, 17–18.02.1990 (VBI 6276 – (atranorin), perlatolic acid).

This saxicolous species was originally known from Mt Kenya (Kenya) from East Africa. It was found in alpine–subnival zone (3,350–4,430 m a.s.l.) (Frisch and Hertel 1998; Frisch 1999). The current record (*Figure 2e*) was found in similarly high elevations in the Kilimanjaro Mts., representing a new distribution record for Tanzania.

Pannaria pannosa (Sw.) Nyl., syn.: *Parmeliella pannosa* (Sw.) Müll. Arg.
Tanzania: Morogoro District, Nguru Mts, S branch of Divue River Valley NW of Mlaguzi village, submontane rainforest, saxicolous at 960–1,080 m a.s.l., T. Pócs & S. Orbán, 89160/M, 30.05.1989 (VBI 6277 – no lichen secondary lichen metabolite detected (black unidentified at atranorin height).

This pantropical, subtropical, corticolous species is fairly common in East Africa and found in Kenya, Tanzania and Uganda. It grows in various forests in the montane to subalpine zone (1,100–3,400 m a.s.l.) (Swinscow and Krog 1988, Alstrup and Christensen 2006).

Parmotrema andinum (Müll. Arg.) Hale
Tanzania: Arusha Region, Ngorongoro District, Ngorongoro Conservation Area, Marera Forest NE of Karatu village, at the E slope of Ayandu Hill, S edge of the forest reserve, dry semideciduous forest with many old *Olea africana,* corticolous at 1,500–1,600 m a.s.l., T. Pócs & S. Chuwa, 89031/E, 19.01.1989 (VBI 6278 – lecanoric acid); Morogoro Region, Morogoro District, Kitulanghalo Forest Reserve 35 km ENE of Morogoro, miombo woodland on the ridge at 560–700 m a.s.l., T. Pócs, 89180/S, 07.06.1989 (VBI 6279 – lecanoric acid); Manyara Region, Mbulu District, Mbulu Highlands, Guam Hills 4 km E of Mbulu town. Datlaa Hill, steep granite outcrop with huge cliffs and boulders, covered by secondary bush at 1,950–2,100 m a.s.l., T. Pócs & J. Linden, 90097/N, 01.06.1990 (VBI 6280 – atranorin, lecanoric acid).

This common corticolous (saxicolous) species is known from all countries of East Africa, found also in South America and Asia. It grows in dry, well-lit sites, open hillsides, parks, gardens and woodlands (900–2,454 m a.s.l.) (Swinscow and Krog 1988; Alstrup *et al.* 2010; Farkas *et al.* 2023). One of the current records was

somewhat lower elevation at 560–700 m a.s.l. in miombo vegetation in Tanzania.

Parmotrema araucariarum (Zahlbr.) Hale
Tanzania: Kilimanjaro Region, Rombo District, Kilimanjaro Mts, NE slope of Mawenzi, WSW of Tarakea village, N side of Nesikiria river, mossy montane evergreen forest dominated by *Hagenia abyssinica*, corticolous at 2,560 m a.s.l., T. Pócs with Mjatta & J. Linden, 90021/AP, 01.02.1990 (VBI 6281 – (atranorin), fatty acid).

This very rare corticolous species was known in East Africa from Kenya and Tanzania. It was also found in South America. It grows in montane forest (2,000–2,100 m a.s.l.) (Swinscow and Krog 1988; Alstrup *et al.* 2010; Farkas *et al.* 2023). In case of the current specimen from Kilimanjaro it was collected from higher elevation (2,560 m a.s.l.), than earlier.

Parmotrema austrosinense (Zahlbr.) Hale
Kenya: Makueni County, Sultan Hamud, towards NW on Mombasa Road A109 near Africa Inland Church Bethel at Pendo Kindergarten, in arid savannah vegetation, on bark and twigs of *Acacia* sp. at 1,270 m a.s.l., 1°58'29.08"S; 37°20'15.84"E, C.N. Kanyungulu, 17.08.2023 (VBI 6282 – atranorin, lecanoric acid. — Tanzania: Arusha Region, Ngorongoro District, Ngorongoro Conservation Area, SE outer slopes of Ngorongoro Crater, in the valley leading to S from Rotian Glade, evergreen riverine forest with *Ilex mitis* and *Hagenia*, *Podocarpus milanjianus*, *Prunus africanus*, saxicolous at 2,000–2,100 m a.s.l., T. Pócs & S. Chuwa, 89027/AU, 18.01.1989 (VBI 6283 – atranorin, lecanoric acid); Arusha Region, Hanang District, Pienaar Heights, Bereku Forest Reserve, along the road on the ridge of Babati, mist effected miombo woodland, saxicolous at 1,800 m a.s.l., T. Pócs & S. Orbán, 89157/Y, 26.05.1989 (VBI 6284 – chloroatranorin, atranorin, zeorin, terpenoid, lecanoric acid).

This common, corticolous (saxicolous) species is known from all East African countries. It is pantropical, and also found in the temperate regions. It grows in well-lit, natural and artificial sites (1,000–3,000 m a.s.l.) (Swinscow and Krog 1988; Alstrup *et al.* 2010; Farkas *et al.* 2023). Here it is reported from further localities from Kenya and Tanzania.

Parmotrema crinitum (Ach.) M. Choisy
Tanzania: Kilimanjaro Region, Rombo District, Kilimanjaro Mts, NE slope of Mawenzi, WSW of Tarakea village, N side of Nesikiria river, 4–6 m tall *Erica arborea* giant heath at 2,680 m a.s.l., T. Pócs with Mjhatta & J. Linden, 90022/AA, 01.02.1990 (VBI 6285 – atranorin, stictic acid, constictic acid).

This fairly common, corticolous, (terricolous/saxicolous) species is known in East Africa from Kenya, Tanzania and Uganda. It is

pantropical, found also in the subtropics. It grows in mist-affected woodland in montane to ericaceous zone (1,400–3,400 m a.s.l.) (Swinscow and Krog 1988; Alstrup *et al.* 2010).

Parmotrema cristiferum (Taylor) Hale
Tanzania: Arusha Region, Ngorongoro District, Ngorongoro Conservation Area, Marera Forest NE of Karatu village, at the E slope of Ayandu Hill, S edge of the forest reserve, dry semideciduous forest with many old *Olea africana,* ramicolous at 1,500–1,600 m a.s.l., T. Pócs & S. Chuwa, 89031/ABA, 19.01.1989 (VBI 6286 – atranorin, salazinic acid).

This rare, corticolous species is known in East Africa from Kenya, Tanzania and Uganda. It is pantropical, found also in the subtropics. It grows in dry or mist-affected lowland areas (300–1,450 m a.s.l.) (Swinscow and Krog 1988).

Parmotrema eunetum (Stirton) Hale
Kenya: Makueni County, Sultan Hamud, towards NW on Mombasa Road A109 near Africa Inland Church Bethel at Pendo Kindergarten, in arid savannah vegetation, on bark and twigs of *Acacia* sp. at 1,270 m a.s.l., 1°58'29.08"S; 37°20'15.84"E, C.N. Kanyungulu, 17.08.2023 (18 Aug) (VBI 6287 – atranorin, gyrophoric acid). — Tanzania: Arusha Region, Ngorongoro District, Ngorongoro Conservation Area, Marera Forest NE of Karatu village, at the E slope of Ayandu Hill, S edge of the forest reserve, dry semideciduous forest with many old *Olea africana,* ramicolous at 1,500–1,600 m a.s.l., T. Pócs & S. Chuwa, 89031/ABB, 19.01.1989 (VBI 6288 – atranorin, gyrophoric acid, 2 fatty acid).

This common, corticolous (saxicolous) species is known from all East African countries. Furthermore it is found in West Africa, Asia and West Indies. It grows in mist-affected inselbergs, montane forests in low alpine zone (1,600–3,800 m a.s.l.) (Swinscow and Krog 1988; Farkas *et al.* 2023).

Parmotrema hababianum (Gyelnik) Hale
Kenya: Makueni County, Sultan Hamud, towards NW on Mombasa Road A109 near Africa Inland Church Bethel at Pendo Kindergarten, in arid savannah vegetation, on bark and twigs of *Acacia* sp. at 1,270 m a.s.l., 1°58'29.08"S; 37°20'15.84"E, C.N. Kanyungulu, 17.08.2023 (VBI 6289 – atranorin, lichesterinic acid, protolichesterinic acid); Kajioado County, Ngong Hill Forest Recreational Park, between KenGen Ngong Wind Power Station and Ziplinning Ngong Hills on volcanic rock/tuff and in arid–semi-arid mixed wood vegetation, saxicolous and corticolous at c. 2,300 m a.s.l., 1°23'03.41"S; 36°38'18.39"E, C.N. Kanyungulu, 12.09.2023 (VBI 6290 – atranorin, lichesterinic acid, protolichesterinic acid).

This common, corticolous, ramicolous species is known from all East African countries. It is found also in Asia, North and South America. It grows in dry, well-lit habitats in montane zone (800–

2,650 m a.s.l.) (Swinscow and Krog 1988; Kirika *et al.* 2018; Alstrup *et al.* 2010; Farkas *et al.* 2023).

Parmotrema lobulascens (J. Steiner) Hale

Tanzania: Kilimanjaro Region, Moshi Rural District, Kilimanjaro Mts, Marangu Route, mosaic of scattered subalpine *Erica arborea* stands and secondary grassland at 2,900–3,000 m a.s.l., T. Pócs & S. Orbán, 89147/M, 20.05.1989 (VBI 6291 – atranorin, alectoronic acid, α-collatolic acid); Rombo District, Kilimanjaro Mts, NE slope of Mawenzi, WSW of Tarakea village, N side of Nesikiria river, 4–6 m tall *Erica arborea* giant heath at 2,580–2,600 m a.s.l., T. Pócs with Mjhatta & J. Linden, 90022/P, 01.02.1990 (VBI 6292 – atranorin, alectoronic acid, α-collatolic acid); Arusha Region, Meru District, Mt Meru, SW slope, subalpine *Erica arborea* giant heath with many *Senecio kilimanjari*, *Myrsine, Rapanea*, *Dirsa stairsii* and *Swertia kilimanjarica* on the SW ridge of the main peak, corticolous at 2,700–3,100 m a.s.l., T. Pócs, Mnyonga & V. R. Nsolomo, 89194/RA, 21.06.1989 (VBI 6293 – atranorin, alectoronic acid, α-collatolic acid).

This common, corticolous, muscicolous, ramicolous, saxicolous, lignicolous species is known from all East African countries. It is known also from South and West Africa and Asia. It grows in wet sites in montane–alpine zone (1,800–4,180 m a.s.l.) (Swinscow and Krog 1988; Frisch and Hertel 1998; Frisch 1999).

Parmotrema nilgherrense (Nyl.) Hale

Tanzania: Morogoro District, Nguru Mts, on the ridge above the Spirit Lake at the N source of Chazi River, just above the huge Chazi Falls, elfin forest, ramicolous at 2,000–2,100 m a.s.l., T. Pócs & E. Knox, 89053/K, 04.02.1989 (VBI 6294 – atranorin, α-collatolic acid, alectoronic acid, gyrophoric acid, protocetraric acid); Nguru Mts, W from Spirit Lake, above Chazi Falls, elfin forest, ramicolous at 2,140 m a.s.l., T. Pócs & S. Orbán, 89165/P, 01.06.1989 (VBI 6295 – atranorin, α-collatolic acid, alectoronic acid).

This common, corticolous, saxicolous, lignicolous species is known from all East African countries and Asia. It grows in montane–ericaceous–alpine zone (2,000–above 4,000 m a.s.l.) (Swinscow and Krog 1988; Frisch and Hertel 1998; Frisch 1999; Alstrup *et al.* 2010; Farkas *et al.* 2023).

****Parmotrema pilosum*** (Stizenb.) Krog & Swinscow

Tanzania: Kilimanjaro Region, Siha District, Kilimanjaro Mts, NW slopes, at Larangwa, dry semi-evergreen forest dominated by *Teclea simplicifolia*, *Calodendrum capense*, *Olea africana* at 1,700 m a.s.l., T. Pócs with Katigula, 90008/N, 19.01.1990 (VBI 6296 – (atranorin), stictic acid).

This fairly common, corticolous, saxicolous species is known in eastern Africa from Kenya, Ethiopia and Uganda. It was found also in South Africa, South America and Australia. It grows in well-lit sites,

solitary trees, artificial habitats in submontane to montane zone (1,300–2,000 m a.s.l.) (Swinscow and Krog 1988). Its collection from Kilimanjaro Mts (*Figure 2f*) represents a new distribution record for Tanzania.

Parmotrema poolii (C.W. Dodge) Krog & Swinscow

Tanzania: Arusha Region, Ngorongoro District, Ngorongoro Conservation Area, Marera Forest NE of Karatu village, at the E slope of Ayandu Hill, S edge of the forest reserve, dry semi-deciduous forest with many old *Olea africana,* ramicolous at 1,500–1,600 m a.s.l., T. Pócs & S. Chuwa, 89031/AP, 19.01.1989 (VBI 6297 – atranorin, alectoronic acid, α-collatolic acid).

This rare, corticolous, saxicolous species is known in East Africa from Kenya and Tanzania. It is known also from Madagascar, Asia and Australia. It grows in submontane–montane forest (900–2,300 m a.s.l) (Swinscow and Krog 1988).

Parmotrema praesorediosum (Nyl.) Hale

Tanzania: Kilimanjaro Region, Siha District, Kilimanjaro Mts, Shira Plateau, at the campsite above S-Engare Nairobi gorge, many cliffs, lava caves and a small stand of *Senecio cottonii* (10–20 trees), saxicolous at 3,580 m a.s.l., T. Pócs & J. Linden, 90031/F, 17–18.02.1990 (VBI 6298 – atranorin, caperatic acid).

This rare, corticolous, saxicolous species is known from all East African countries. It is pantropical and found also in the southern temperate regions. It grows in fairly dry, well-lit sites in lowland–montane zone (700–1,800 m a.s.l) (Swinscow and Krog 1988). The here reported collection from the Kilimanjaro Mts was found in high elevation (3,580 m a.s.l.).

Parmotrema reticulatum (Taylor) M. Choisy

Kenya: Kajiado County, Ngong Hill Forest Recreational Park, between KenGen Ngong Wind Power Station and Ziplinning Ngong Hills on volcanic rock/tuff and in arid–semi-arid mixed wood vegetation, saxicolous and corticolous at c. 2,300 m a.s.l., 1°23'03.41"S; 36°38'18.39"E, C.N. Kanyungulu, 12.09.2023 (VBI 6299 – atranorin, salazinic acid). — Tanzania: Arusha Region, Ngorongoro District, Ngorongoro Conservation Area, E side of the mean Oldeani summit, high altitude *Hagenia* forest at the timberline with *Agauria salicifolia* and *Pittosporum viridiflora*, corticolous at 3,200 m a.s.l., T. Pócs, 89005/H, 02.01.1989 (VBI 6300 – atranorin, salazinic acid); Kilimanjaro Region, Rombo District, Kilimanjaro Mts, NE slope of Mawenzi, WSW of Tarakea village, N side of Nesikiria river, 4–6 m tall *Erica arborea* giant heath at 2,580–2,600 m a.s.l., T. Pócs with Mjhatta & J. Linden, 90022/M, 01.02.1990 (VBI 6301 – atranorin, salazinic acid).

This common, corticolous, saxicolous, terricolous species is known from all East African countries. It is pantropical and found

also in the temperate regions. It grows in natural, artificial habitats, submontane–subalpine forest (1,000–3,000 m a.s.l.) (Swinscow and Krog 1988; Alstrup *et al.* 2010; Kirika *et al.* 2018; Farkas *et al.* 2023).

Parmotrema subschimperi (Hale) Hale

Tanzania: Arusha Region, Ngorongoro District, Ngorongoro Conservation Area, subalpine *Stoebe kilimanjarica* bush, saxicolous at 2,800–3,100 m a.s.l., T. Pócs, 89002/Z, 02.01.1989 (VBI 6302 – atranorin, norstictic acid, gyrophoric acid); Ngorongoro Conservation Area, NE rim, inner slope NW of Oljoro Nyuki, mature, mist effected but heavily grazed *Acacia lahai* stand, very rich in epiphytes, ramicolous at 2,220 m a.s.l., T. Pócs, A. Kijazi & P. Murphy, 89011/B, 09.01.1989 (VBI 6303 – atranorin, gyrophoric acid); Dodoma Region, Kondoa District, Salenga Forest Reserve on the ridge along the road between Bereku and Kondoa, mist effected miombo woodland, at 1,900 m a.s.l., T. Pócs & S. Orbán, 89158/D, 26.05.1989 (VBI 6304 – gyrophoric acid); Morogoro Region, Morogoro District, Nguru Mts, S branch of Divue Valley 1 km W of Mlaguzi village, submontane rainforest, saxicolous at 1,000–1,300 m a.s.l., T. Pócs & D. Emmrich, 89224/CLA, 23-24.09.1989 (VBI 6305 – atranorin, ?, gyrophoric acid).

This common, corticolous, saxicolous, muscicolous species is known from all East African countries. It grows in more or less shady sites, montane forests in low alpine zone (1,800–above 4,000 m a.s.l.) (Hale 1972; Swinscow and Krog 1988; Frisch and Hertel 1998; Frisch 1999). One of its current record was collected in lower elevations (at 1,000–1,300 m a.s.l.) in Morogoro Region, Tanzania.

Parmotrema subisidiosum (Müll. Arg.) Hale

Tanzania: Arusha Region, Meru District, Mt Meru, SW slope, subalpine *Erica arborea* giant heath with many *Senecio kilimanjari*, *Myrsine, Rapanea*, *Dirsa stairsii* and *Swertia kilimanjarica* on the SW ridge of the main peak, on *Erica* at 2,700–3,100 m a.s.l., T. Pócs, Mnyonga & V. R. Nsolomo, 89194/APC, 21.06.1989 (VBI 6306 – atranorin, salazinic acid); Kilimanjaro Region, Rombo District, Kilimanjaro Mts, NE slope of Mawenzi, WSW of Tarakea village, N side of Nesikiria river, 4–6 m tall *Erica arborea* giant heath at 2,580–2,600 m a.s.l., T. Pócs with Mjhatta & J. Linden, 90022/T, 01.02.1990 (VBI 6307 – atranorin, fatty acid, salazinic acid).

This common, corticolous, saxicolous species is known from all East African countries. It is pantropical and found also in the temperate regions. It is found in mist-affected woodland and montane forest (1,800–2,400 m a.s.l.) (Swinscow and Krog 1988).

Parmotrema tinctorum (Nyl.) Hale

Tanzania: Arusha Region, Ngorongoro District, Ngorongoro Conservation Area, Marera Forest NE of Karatu village, at the E slope of Ayandu Hill, S edge of the forest reserve, dry semideciduous forest with many old *Olea africana,* ramicolous at 1,500–1,600 m a.s.l., T. Pócs & S. Chuwa, 89031/AK, 19.01.1989 (VBI 6308 –

atranorin, lecanoric acid); Morogoro Region, Kilosa District, Mamboya Hills, round granitic rock outcrop near Magubike along the Morogoro–Dodoma highway, *Xerophyta scabrida* (Velloziaceae) bush on the rock summit at 880 m a.s.l., T. Pócs & H. Krog, 89217/QB, EA, 25.08.1989 (VBI 6309, 6310 – atranorin, ?, lecanoric acid).

This common, corticolous, saxicolous species is known from all East African countries. It is pantropical and found also in the temperate regions. It grows in mangroves, coastal hills, well-lit upland habitat (c. 2,700 m a.s.l.) (Swinscow and Krog 1988; Farkas *et al.* 2023). The current records were collected in lower elevations (880–1,600 m a.s.l.) in the Arusha and Morogoro Regions, Tanzania.

Phaeophyscia confusa Moberg

Tanzania: Arusha Region, Ngorongoro District, Ngorongoro Conservation Area, NE rim, inner slope NW of Oljoro Nyuki, mature, mist effected but heavily grazed *Acacia lahai* stand, very rich in epiphytes, ramicolous at 2,220 m a.s.l., T. Pócs, A. Kijazi & P. Murphy, 89011/JA, 09.01.1989 (VBI 6311 – no lichen secondary metabolite detected).

This locally common, predominanty corticolous species is known from all countries of East Africa, found in open sites, wayside trees, woodland, montane–supalpine zone (1,200–3,500 m a.s.l.) (Swinscow and Krog 1988; Farkas *et al.* 2023).

Phaeophyscia endococcinodes (Poelt) Essl.

Tanzania: Kilimanjaro Region, Moshi Rural District, Kilimanjaro Mts, Marangu Route, gorge with *Senecio*-species below Horombo Hut at 3,750–3,800 m a.s.l., T. Pócs & S. Orbán, 89149/Z, 20.05.1989 (VBI 6312 – skyrin yellow pigment, terpenoids).

This saxicolous, muscicolous, humicolous species is locally common in East Africa, found also in North America, Asia and New Zealand. It grows in exposed to shady, wet sites, at riversides, in montane to alpine zones (1,500–4,450 m a.s.l.) (Swinscow and Krog 1988; Frisch and Hertel 1998; Frisch 1999).

Phaeophyscia hispidula (Ach.) Essl.

Tanzania: Manyara Region, Mbulu District, Mbulu Highlands, Guay Hill at the N end of Nou Forest Reserve, dry, semideciduous forest, saxicolous at 2,000–2,050 m a.s.l., T. Pócs & J. Linden, 90096/O, 01.06.1990 (VBI 6313 – no lichen secondary metabolite detected).

This fairly common pantropical, subtropical, corticolous, (saxicolous, terricolous/muscicolous) species is known from all countries of East Africa. It grows in shady sites at submontane–subalpine elevations (1,500–3,050 m a.s.l.) (Swinscow and Krog

1988; Kirika *et al.* 2018). This Tanzanian specimen was collected from rocks.

Physcia erumpens Moberg

Kenya: Makueni County, Sultan Hamud, towards NW on Mombasa Road A109 near Africa Inland Church Bethel at Pendo Kindergarten, in arid savannah vegetation, on bark and twigs of *Acacia* sp. at 1,270 m a.s.l., 1°58'29.08"S; 37°20'15.84"E, C.N. Kanyungulu, 17.08.2023 (VBI 6314 – atranorin, zeorin; atranorin, divaricatic acid, zeorin, terpenoids).

This common, predominantly corticolous species is known from all countries of East Africa, distributed in South Africa, SW North America, Mexico, South America, SE Asia, Australia and New Zealand. It grows from the coastal regions to the lowland–subalpine zone (0–3,100 m a.s.l.) (Swinscow and Krog 1988; GBIF/Physcia erumpens 2025; Lichenportal/Physcia erumpens 2025).

Physcia poncinsii Hue

Kenya: Kajioado County, Ngong Hill Forest Recreational Park, between KenGen Ngong Wind Power Station and Ziplinning Ngong Hills on volcanic rock/tuff and in arid–semi-arid mixed wood vegetation, saxicolous and corticolous at c. 2,300 m a.s.l., 1°23'03.41"S; 36°38'18.39"E, C.N. Kanyungulu, 12.09.2023 (VBI 6315 – atranorin, zeorin).

This common, corticolous, ramicolous, saxicolous species is known from all East African countries. It is known other parts of Africa, from Madagascar, La Reunion and South Africa. Furthermore it occurs in the Americas, SE Asia, Australia and New Zealand, a tropical, subtropical species growing in montane zones (1,000–2,400 m a.s.l.) (Swinscow and Krog 1988; Alstrup *et al.* 2010; Lichenportal/Physcia poncinsii 2025).

Physcia undulata Moberg

Kenya: Kajioado County, Ngong Hill Forest Recreational Park, between KenGen Ngong Wind Power Station and Ziplinning Ngong Hills on volcanic rock/tuff and in arid–semi-arid mixed wood vegetation, saxicolous at c. 2,300 m a.s.l., 1°23'03.41"S; 36°38'18.39"E, C.N. Kanyungulu, 12.09.2023 (VBI 6316 – atranorin, zeorin, terpenoids).

This locally common corticolous, ramicolous species is known form Ethiopia and Kenya from East Africa, also from West and South Africa, Madagascar, the Americas, Australia, New Zealand. Earlier it was found in open sites in lowland to subalpine zone (500–3,000 m a.s.l.) (Swinscow and Krog 1988; GBIF/Physcia undulata 2025). The current record was collected from rocks in the Ngong Hill, Kenya.

Polyblastidium japonicum (M. Satô) Kalb

Tanzania: Kilimanjaro Region, Moshi Rural District, Kilimanjaro Mts, Marangu Route, subalpine *Erica arborea* forest around Mandara Hut at 2,600–2,850 m a.s.l., T. Pócs & S. Orbán, 89145/A, 19., 22.05.1989 (VBI 6317 – atranorin, zeorin, terpenoids).

This common corticolous, muscicolous, ramicolous (on *Erica arborea*, *Senecio keniodendron*) species found in Africa, all countries in East Africa, also in Asia and New Zealand (Swinscow and Krog 1988; Frisch and Hertel 1998; Frisch 1999; Alstrup *et al.* 2010; Kirika *et al.* 2018; Farkas *et al.* 2023). It grows in open sites up to the upper alpine zone (1,800–4,200 m a.s.l).

Polyblastidium microphyllum (Kurok.) Kalb, syn.: *Heterodermia microphylla* (Kurok.) Skorepa

Tanzania: Morogoro District, Nguru Mts, S branch of Divue River Valley NW of Mlaguzi village, submontane rainforest, saxicolous at 960–1,080 m a.s.l., T. Pócs & S. Orbán, 89160/P, 30.05.1989 (VBI 6318 – atranorin, zeorin, terpenoids).

This common corticolous and more seldom saxicolous species was previously found from East Africa in Ethiopia, Kenya and Tanzania. Known also in South Africa, South America, Asia, Australia and New Zealand (Swinscow and Krog 1988; Alstrup *et al.* 2010; Mongkolsuk *et al.* 2015; Kirika *et al.* 2018). It grows on wayside trees, lowland to montane forests (10–3,000 m a.s.l.). This record was found on rocks in Tanzania.

Pseudocyphellaria argyracea (Delise) Vain.

Tanzania: Morogoro District, Nguru Mts, S branch of Divue Valley 1 km W of Mlaguzi village, submontane rainforest, saxicolous at 1,000–1,300 m a.s.l., T. Pócs & D. Emmrich, 89224/CLB, 23-24.09.1989 (VBI 6319 – lichen metabolites were not analysed).

It is widespread corticolous, ramicolous, muscicolous, terricolous, lignicolous, seldom saxicolous species in the tropics, from East Africa known and widely collected form the Comoro Islands, Madagascar and Tanzania, but has fewer records from Kenya and Uganda. It grows in damp, shady sites in montane forests, mist-affected woodland (500–2,300 m a.s.l) (Swinscow and Krog 1988). It was confirmed from Kenya by Kaasalainen *et al.* (2021), from Tanzania by Farkas (2003), Alstrup and Christensen (2006) and the current collection.

Pseudocyphellaria dozyana (Mont. & v.d. Bosch) D.J. Galloway
Tanzania: Kilimanjaro Region, Rombo District, Kilimanjaro Mts, NE slope of Mawenzi, WSW of Tarakea village, N side of Nesikiria river, 4–6 m tall *Erica arborea* giant heath at 2,580–2,600 m a.s.l., T. Pócs with Mjhatta & J. Linden, 90022/OA, 01.02.1990 (VBI 6320 – fatty acid, terpenoid).

It is a predominantly paleotropical species with scattered records, but wide distribution, but found also in the Galapagos Island in Eastern Pacific and Ecuador, furthermore from Cuba and Jamaica (Lichenportal/Pseudocyphellaria dozyana 2025). Corticolous on living and dead trees and shrubs in primary and secondary rainforest (550–2,000 m a.s.l.) (Galloway 1994). Earlier East African records were known from Tanzania (Farkas 2003). The current record from Kilimanjaro grows in somewhat higher elevation (at 2,600 m a.s.l.) in ericaceous heath.

Punctelia stictica (Duby) Krog
Kenya: Kajiado County, Ngong Hill Forest Recreational Park, between KenGen Ngong Wind Power Station and Ziplinning Ngong Hills on volcanic rock/tuff and in arid–semi-arid mixed wood vegetation, saxicolous and corticolous at c. 2,300 m a.s.l., 1°23'03.41"S; 36°38'18.39"E, C.N. Kanyungulu, 12.09.2023 (VBI 6321 – gyrophoric acid).

This very rare saxicolous species is known in East Africa from Ethiopia and Kenya, also from other parts of Africa, furthermore from Europe, and the Americas. It occurs in subalpine–alpine zones (3,250–4,100 m a.s.l.) (Swinscow and Krog 1988).

Pyxine convexior (Müll. Arg.) Swinscow & Krog
Kenya: Makueni County, Sultan Hamud, towards NW on Mombasa Road A109 near Africa Inland Church Bethel at Pendo Kindergarten, in arid savannah vegetation, on bark and twigs of *Acacia* sp. at 1,270 m a.s.l., 1°58'29.08"S; 37°20'15.84"E, C.N. Kanyungulu, 17.08.2023 (VBI 6322 – (atranorin)).

In East Africa it has been found very rarely in Kenya and Tanzania on bark in partial shade (1,000–1,270 m a.s.l.) (Swinscow and Krog 1988). Confirmed by this current record from Kenya. It occurs also in Australia.

Ramalina africana (Stein) C.W. Dodge
Kenya: Makueni County, Sultan Hamud, towards NW on Mombasa Road A109 near Africa Inland Church Bethel at Pendo Kindergarten, in arid savannah vegetation, on bark and twigs of *Acacia* sp. at 1,270 m a.s.l., 1°58'29.08"S; 37°20'15.84"E, C.N. Kanyungulu, 17.08.2023 (VBI 6323 – ((usnic acid), sekikaic acid, norstictic acid).

This corticolous species is known also from South America and Asia. It is common in East Africa in both natural and artificial

habitats at dry, exposed, sunny places (800–2,700 m a.s.l.) (Swinscow and Krog 1988). Confirmed from the Kenyan Ngong District (near Kajiado – Alstrup *et al.* 2010) and from Makueni County (at Sultan Hamud) by current record.

#*Roselliniella africana Diederich

Tanzania: Kilimanjaro Region, Moshi Rural District, Kilimanjaro Mts, Marangu Route, gorge with *Senecios* below Horombo Hut at 3,750–3,800 m a.s.l., T. Pócs & S. Orbán, 89149/UA, 20.05.1989 (VBI 6326); Arusha Region, Meru District, Mt Meru, SW slope, subalpine *Erica arborea* giant heath with many *Senecio kilimanjari*, *Myrsine, Rapanea*, *Dirsa stairsii* and *Swertia kilimanjarica* on the SW ridge of the main peak, on *Erica* at 2,700–3,100 m a.s.l., T. Pócs, Mnyonga & V. R. Nsolomo, 89194/BBC, 21.06.1989 (on VBI 6327 *Usnea aristata*).

The perithecia are immersed in the host thalli, ostiolar region erumpent (*Figure 1c–d*), asci contain 8 ascospores which are simple, dark brown when mature, 45–52 × 17–19 µm with a distinct 1.5–2 µm thick perispore. The species was described from Rwanda (Aptroot *et al.* 1997) and this is a new distribution record from Tanzania, East Africa.

Umbilicaria cinereorufescens (Schaer.) Frey

Tanzania: Kilimanjaro Region, Siha District, Kilimanjaro Mts, Shira Plateau, near the campsite above Engare Nairobi gorge, alpine semidesert tussock and *Philippia* bush, saxicolous at 3,550 m a.s.l., T. Pócs with K. Pócs & J. Linden, 90030/M, 17.02.1990 (VBI 6324 – (norstictic acid), gyrophoric acid).

This saxicolous species grows in Europe, Greenland, North America. It is fairly common in East Africa at exposed sites, in alpine–upper alpine zone (3,350–4,600 m a.s.l.) (Swinscow and Krog 1988) Confrimed from Mt. Kenya at the end of the 1990s (Frisch and Hertel 1998; Frisch 1999) and from Tanzania by the current record.

Umbilicaria umbilicarioides (Stein) Krog & Swinscow

Tanzania: Kilimanjaro Region, Siha District, Kilimanjaro Mts, Shira Plateau, at the campsite above S-Engare Nairobi gorge, many cliffs, lava caves and a small stand of *Senecio cottonii* (10–20 trees), saxicolous at 3,580 m a.s.l., T. Pócs & J. Linden, 90031/TA, 17–18.02.1990 (VBI 6325 – norstictic acid).

This common saxicolous species is known from South Africa, Zaire (Congo), Patagonia and the antarctic region. In East Africa it grows at sligthly eutrophicated sites in the ericaceous–alpine zone (3,350–4,600 m a.s.l.) (Swinscow and Krog 1988). Confrimed from Mt. Kenya at the end of 1990s (Frisch and Hertel 1998; Frisch 1999) and from the Kilimanjaro Mts by current record.

***Usnea aristata** Mot.

Tanzania: Kilimanjaro Region, Moshi Rural District, Kilimanjaro Mts, Marangu Route, gorge with *Senecios* below Horombo Hut at 3,750–3,800 m a.s.l., T. Pócs & S. Orbán, 89149/UA, 20.05.1989 (VBI 6326); Arusha Region, Meru District, Mt Meru, SW slope, subalpine *Erica arborea* giant heath with many *Senecio kilimanjari*, *Myrsine, Rapanea*, *Dirsa stairsii* and *Swertia kilimanjarica* on the SW ridge of the main peak, on *Erica* at 2,700–3,100 m a.s.l., T. Pócs, Mnyonga & V. R. Nsolomo, 89194/BBC, 21.06.1989 (VBI 6327 – usnic acid, fumarprotocetraric acid).

Motyka (1961) described this very rare corticolous, ramicolous species from Kenya, also known from Ethiopia. It grows in montane–ericaceous zone (3,000–3,500 m a.s.l.) (Motyka 1961; Swinscow and Krog 1988), and the here identified specimen (*Figure 3a–b*) represents a new distribution record for Tanzania.

Figure 3. The thalli of lichen species, **a–b**) *Usnea aristata*, **c–d**) *Xanthoparmelia phaeophana*. Scale: a–b = 1 mm, c–d = 2 mm.

Usnea bornmuelleri J. Steiner
Kenya: Makueni County, Kiou Hill at Makueni, S and above Kiou Primary School, saxicolous at 1,650 m a.s.l., 1°56'57.65"S; 37°19'23.51"E, mother of C. N. Kanyungulu, 2000 (VBI 6328 – usnic acid, protocetraric acid).

It is known from East, Central and West Africa mostly from montane and low alpine zone (2,400-4,200 m a.s.l.), however, this record originates from somewhat lower elevation from Kiou Hill, Kenya (Swinscow and Krog 1976, 1988). Its analgesic role was reported recently from the same collection (Kanyungulu and Farkas 2025).

Xanthoparmelia africana Hale
Tanzania: Kilimanjaro Region, Siha District, Kilimanjaro Mts, Shira Plateau, at the campsite above S-Engare Nairobi gorge, many cliffs, lava caves and a small stand of *Senecio cottonii* (10–20 trees), saxicolous at 3,580 m a.s.l., T. Pócs & J. Linden, 90031/T, 17–18.02.1990 (VBI 6329 – usnic acid, salazinic acid); Moshi Rural District, Kilimanjaro Mts, Marangu Route, gorge with *Senecios* below Horombo Hut at 3,750–3,900 m a.s.l., T. Pócs & S. Orbán, 89149/E, 20.05.1989 (VBI 6330 – usnic acid, salazinic acid); Kilimanjaro Mts, Marangu Route, spring bog at the "Last Water" at 3,900 m a.s.l., T. Pócs & S. Orbán, 89151/B, 21.05.1989 (VBI 6331 – usnic acid, salazinic acid).

It is known from eastern and southern Africa in the alpine zone (3,400–4,300 m a.s.l.) (Swinscow and Krog 1988; Frisch and Hertel 1998; Frisch 1999; Hale 1990; Farkas *et al.* 2023).

Xanthoparmelia kiboensis (Dodge) Krog & Swinscow
Tanzania: Kilimanjaro Region, Moshi Rural District, Kilimanjaro Mts, Marangu Route, spring bog at the "Last Water" at 3,900 m a.s.l., T. Pócs & S. Orbán, 89151/E, 21.05.1989 (VBI 6332 – usnic acid, salazinic acid).

Known from countries of East Africa: Ethiopia, Kenya, Tanzania, Uganda (Swinscow and Krog 1988, Frisch and Hertel 1998; Frisch 1999; Hale 1990). It grows on rocks, mosses and soil in higher elevation in the ericaceous and alpine zones from 3,000 to 5,000 m a.s.l.

****Xanthoparmelia phaeophana*** (Stirton) Hale
Tanzania: Arusha Region, Ngorongoro District, Ngorongoro Conservation Area, SE outer slopes of Ngorongoro Crater, in the valley leading to S from Rotian Glade, evergreen riverine forest with *Ilex mitis* and *Hagenia*, *Podocarpus milanjianus*, *Prunus africanus*, saxicololus at 2,000–2,100 m a.s.l., T. Pócs & S. Chuwa, 89027/AQ, 18.01.1989 (VBI 6333 – usnic acid, succinprotocetraric acid/fumarportocetraric acid (protocetraric acid).

It is widely spread in Africa (Hale 1990), known from Ethiopia, Kenya and Uganda from East Africa (Swinscow and Krog 1988). The here presented specimen (*Figure 3c–d*) is a new distribution record for Tanzania.

Xanthoparmelia tinctina (Maheu & A. Gillet) Hale
Tanzania: Arusha Region, Ngorongoro District, Ngorongoro Conservation Area, subalpine *Stoebe kilimanjarica* bush, saxicolous at 2,800–3,100 m a.s.l., T. Pócs, 89002/X, 02.01.1989 (VBI 6334 – usnic acid, salazinic acid); Ngorongoro Conservation Area, the rocky main summit of Oldonyo Oldeani, subalpine dwarf bush of *Crotalaria agatiflora* ssp. *engleri*, *Psoralea foliosa*, *Myrsine africana*, *Kotschya recurvifolia*, saxicolous at 3,200–3,215 m a.s.l., T. Pócs, 89004/AB, 02.01.1989 (VBI 6335 – usnic acid, salazinic acid).

It is a widespread species in the tropics and warm temperate regions. It has a relatively recent record from Tanzania (Alstrup *et al.* 2010).

CONCLUSIONS

New records of Kenyan and Tanzanian specimens were identified and data of 57 species reported and evaluated, indicating that even the relatively well known East African region is far from fully being explored. A further occurrence of the recently described *Bulbothrix kenyana* (Kirika *et al.* 2017) was detected from Tanzania, where it was already reported by Farkas *et al.* (2023). *Flavoparmelia pachydactyla* (Hale) Hale, *Hypogymnia subobscura* (Vain.) Poelt, *Hypotrachyna microblasta* (Vain.) Hale, *Montanelia disjuncta* (Erichsen) Divakar, A. Crespo, Wedin & Essl., *Parmotrema pilosum* (Stizenb.) Krog & Swinscow, *Usnea aristata* Mot. and *Xanthoparmelia phaeophana* (Stirton) Hale represent new distribution records for Tanzania. Additionally, *Hypogymnia subobscura* (Vain.) Poelt is a new distribution record for East Africa. Future field studies in countries of East Africa may result in a better knowledge of species distribution in the area. The records of lichenicolous fungi presented from East Africa are the *Biatoropsis usnearum* Räsänen species complex, *Didymocyrtis melanelixiae* (Brackel) Diederich, R.C. Harris & Etayo, *Echinothecium hypogymniae* Zhurb. (new for East Africa), *Lichenoconium erodens* M.S. Christ. & D. Hawksw. and *Roselliniella africana* Diederich (new for Tanzania). The identification of these specimens was difficult because of the lack of sufficiant material and the age of the collection. Further taxonomic novelties are expected

by a more detailed and lichenicolous fungus targeted study in this promising region.

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