

Advancing the understanding of Tanzania's lichen flora: a comprehensive review

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Abstract. Tanzania possesses various types of forest ecosystems, such as miombo woodlands, mangroves, and montane forests, which support a wide range of biodiversity, including lichens. In our recent studies of lichens in Tanzania, we have observed a significant lack of documented records. Therefore, we are presenting, for the first time, an initial checklist of lichen species compiled using existing literature and augmented with our own fieldwork and observations. This checklist encompasses a total of 581 lichen species in 112 genera. It offers a comprehensive overview of the lichen flora present in Tanzania. Furthermore, we summarize the secondary chemistry and potential medicinal uses of these lichens.

Key words: bioactive compounds, checklist, diversity, lichens

Introduction

The United Republic of Tanzania is located in Eastern Africa and borders the Indian Ocean in the east. Tanzania is considered among Africa's fastest growing countries having a population of more than 51 million and an annual population growth rate of 2.6% (CIA 2018). Tanzania's forest areas are well known for their rich biodiversity. However, mycological exploration, particularly that of lichens, has been limited. Thus, there is a scarcity of information on lichen species biodiversity.

Research on lichens in Tanzania occurred mostly in previous decades (Krog & Swinscow 1982, 1983; Swinscow & Krog 1986a, b, c, 1988; Krog 1993, 1994, 2000; Alstrup & Aptroot 2005; Alstrup & Christensen 2006; Alstrup et al. 2010). Recent research has resulted in several papers on the lichen flora of Tanzania (Kaasalainen et al. 2018; Temu et al. 2019a, b; Bolunda & Kitara 2024). These papers documented several new records to Tanzania (*Calicium lenticulare* and *Chaenothecopsis debilis*), Africa (*Chaenotheca hispidula* and *Pyrgillus cambodiensis*), and to science; *Chaenothecopsis kilimanjaroensis* and *Placopsis craterifera* (Temu et al. 2019b; Bolunda & Kitara 2024).

This paper provides a preliminary checklist of the lichens reported in Tanzania to date, offering a comprehensive summary of the lichen flora of Tanzania and including highlights of the available information on their

secondary chemistry and potential medicinal applications. This contribution constitutes an important step toward a better understanding of the Tanzanian lichens.

Lichen investigations in Tanzania

The major exploration of the lichen flora of Tanzania was conducted during the 20th century by T.D.V. Swinscow and H. Krog, who, focusing on macrolichens, covered all of East Africa including Tanzania (Krog & Swinscow 1982, 1983; Swinscow & Krog 1986a, b, c; Krog 1993, 1994). Their work resulted in a comprehensive treatment of the macrolichens in East Africa (Swinscow & Krog 1988) and the corticolous macrolichens of low montane forests (Krog 2000). Later, at the beginning of the 21st century, V. Alstrup also made important contributions to the knowledge of the lichen flora in Tanzania (Alstrup & Aptroot 2005; Alstrup & Christensen 2006; Alstrup et al. 2010). Further studies have been carried out by visiting scientists from other countries, for example the Kili project (Kaasalainen et al. 2018, 2021, 2022, 2023). Several lichens collected in Tanzania were distributed by Vězda 2008 in his exsiccate. Other recent contributions to Tanzanian lichen flora have been made by Temu et al. (2019a, b) who focused on both macro- and microlichens with a focus on molecular techniques, and Bolunda & Kitara (2024) who described the new species *Placopsis craterifera*.

In 2016, together with a small group of Tanzanian mycological researchers, we commenced investigating the lichen flora of Tanzania with the assistance of renowned world lichen experts that co-authored our first two papers (Temu et al. 2019a, b). The primary focus was on two

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groups: the genus *Usnea* and the calicioid lichens. However, during the course of fieldwork, we encountered additional lichen groups that are yet to be identified. During recent field surveys of the forests of Mount Kilimanjaro National Park (Kilimanjaro region), Usambara Mountains (Tanga region) and Arusha (Fig. 1), we collected several noteworthy lichens (Fig. 2). When we interviewed nearby villagers in an effort to investigate local ethnobotanical knowledge of the lichens (Temu et al. 2019a, b), interestingly, we found that most of the villagers were not aware of the lichens in general.

It became evident that the lichen flora of Tanzania is poorly documented, with most historical records, primarily those by early researchers such as Swinscow and Krog (1988), requiring verification in light of modern taxonomic concepts and molecular methods. These earlier studies relied on conventional morphological approaches, which may no longer fully capture the diversity or accurately delineate species. Additionally, insights from local ethnobotanical knowledge about lichens appear limited, suggesting that there may not be a significant amount of unpublished traditional knowledge from indigenous communities regarding their taxonomy or potential uses. Building on molecular techniques, two studies focusing on *Usnea* and calicioid lichens were published, representing some of the first contemporary contributions to understanding Tanzanian lichen diversity (Temu et al. 2019a, b).

Medicinal potential of lichens

A major value of lichens lies in their biological activity and the potential use of their secondary metabolites for medicinal purposes. The lichen substances were tested for antibacterial activity early in the 20th century. It was

found that the majority of them resulted in activity against mycobacteria and Gram-positive organisms (Stoll et al. 1950). Vartia (1973) published a review of the screening for antibacterial activity in the 20th century. In the current century, the potential use of lichen substances for treatment of various diseases has been documented (Huneck 1999; Yamamoto 2000; Müller 2001). Traditionally, some lichens are well known for folk medicine (Richardson 1988; Schindler 1988; Hawksworth 2003). Usnic acid is among the most famous lichen substances; many of its properties have been described (Ingolfsdottir 2002). In Asia, lichens are frequently used as an alternative medicine (Saklani & Upreti 1992). Studies on antifungal activities have been reported in some Indian lichens (Shahi et al. 2000, 2001, 2003). Still more studies have documented ethnobotanical uses of lichens in India (Brij Lal & Upreti 1985; Brij Lal et al. 1985; Kumar & Upreti 2001).

In Tanzania, like many other countries on the African continent, very little is known about the medicinal value of lichens. They could be so much more valuable than their current limited and questionably sustainable domestic use as fire starters and the like. In a world challenged by antibiotic resistance, lichens could provide an invaluable resource for the discovery of novel antimicrobial agents.

Material and methods

Preparation of the checklist

This checklist is based on information gathered from published sources, including all types of relevant studies published in peer-reviewed journals, literature searches in various databases, including Google Scholar, CAB index, Scopus, Aljol and Ebisco, Digital Libraries, book chapters,

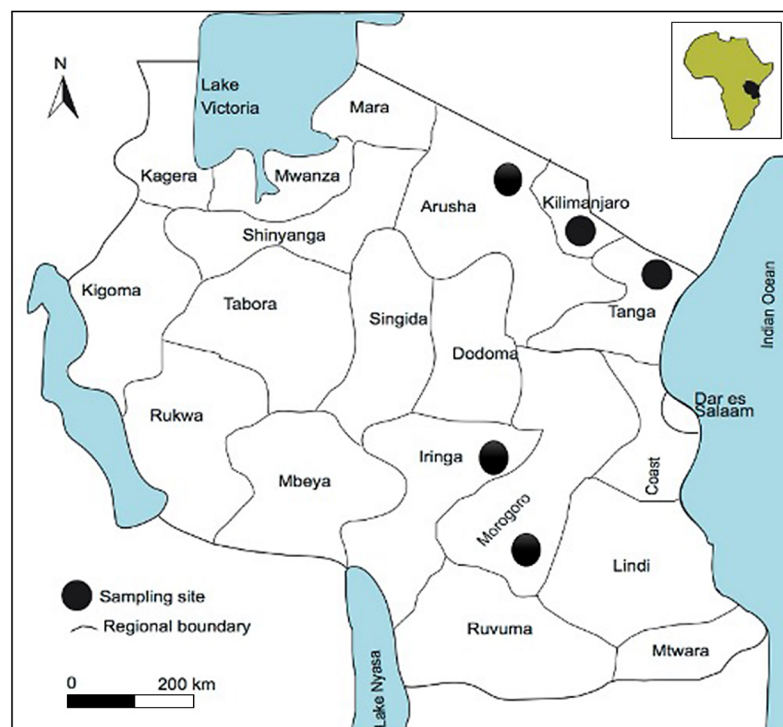


Figure 1. A map showing regions of Tanzania where recent lichen investigations have been conducted, indicated by black dots. Modified from Temu et al. (2019a).

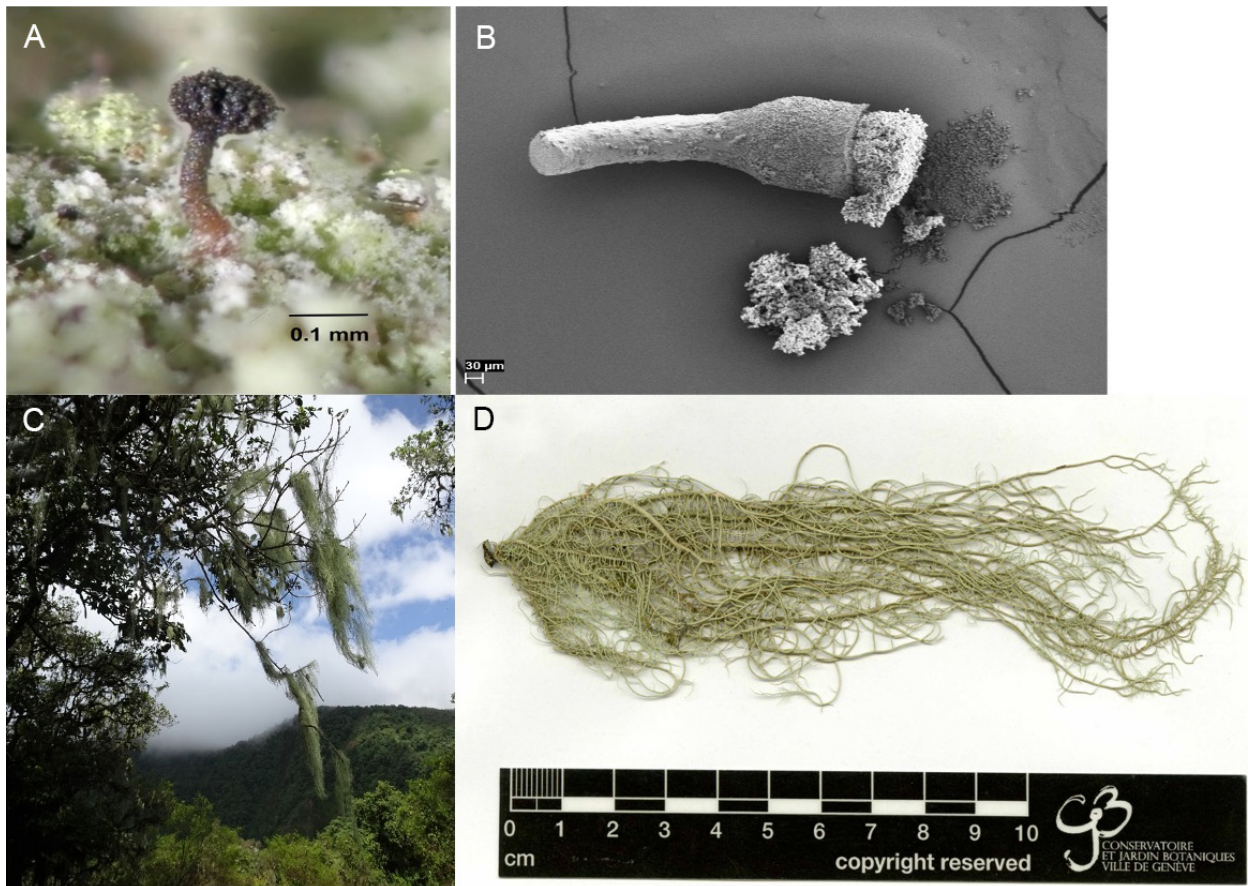


Figure 2. Pictures of some micro- and macrolichens collected in Kilimanjaro. A – *Chaenothecopsis kilimanjaroensis*; B – *Calicium hyperelloides* as visualised on SEM; C – *Usnea* sp. on twigs of a tree; D – *Usnea baileyi*. (Source: Temu et al. 2019a, b; Temu 2021)

and reports on the subject matter. The distribution of the species within Tanzania and worldwide has been indicated, except in a few cases where the information is very incomplete. The utmost challenge for us was with early publications. Accessing these early publications posed significant challenges, as many are not readily available online and only a limited number exist in digital formats. However, we obtained some records through assistance from herbarium databases.

Our original fieldwork and observations are described in the most recent lichen work published by Temu et al. (2019a, b). Species names were confirmed by the Index Fungorum website (<http://www.indexfungorum.org/names/names.asp>) and Mycobank (<https://www.mycobank.org/>).

Results

List of the lichen flora in Tanzania

Here, we report 581 species of lichens in 112 genera from Tanzania. They are listed alphabetically, with accepted names given in bold. Each species is followed by distribution and secondary chemistry where available. It is important to note that some of the species included in this checklist are from unlichenized genera, for example *Chaenothecopsis*, here denoted by the symbol “*”. These taxa are traditionally included with calicioid lichens due to their resemblance in morphology (Bessey 1907).

Please note that the country that was formally known and herein referred to as Zaire is currently known as Democratic Republic of Congo.

Alectoria sarmentosa (Ach.) Ach.

Distribution. Tanzania; distributed in arctic alpine and the boreal regions of the north hemisphere (Swinscow & Krog 1988).

Chemistry. Alectoronic acid; usnic acid (Swinscow & Krog 1988).

Anisomeridium tamarindi (Fée) R.C. Harris

Distribution. A pantropical species. In Africa; Angola, Cameroon and South Africa (Harris 1995; Alstrup & Aptroot 2005).

Anisomeridium terminatum (Nyl.) R.C. Harris

Distribution. A pantropical species (Alstrup & Aptroot 2005).

Anzia afromontana R. Sant.

Distribution. Subalpine zone in montane forests in Tanzania, Kenya and Uganda (Swinscow & Krog 1988).

Chemistry. Atranorin; divaricatic acid (Swinscow & Krog 1988).

Arthonia accolens Stirt.

Distribution. Widespread in tropical areas with dry evergreen and semi-evergreen forests, lowland forest, submontane forests, rocky forests (Farkas 1987, 2015).

Arthonia calamicola (Sydow) R. Sant.

Distribution. Philippines, Malaysia, Tanzania (Farkas 1987).

Arthonia cyanea Müll. Arg.

Distribution. Widespread in tropical areas with lowland forest and rocky forests (Farkas 1987, 2015).

Arthonia trilocularis Müll. Arg.

Distribution. Republic Guinea and Tanzania (Farkas 1987).

Bacidina apiahica (Müll. Arg.) Vězda

Distribution. Widespread in tropical areas characterized by submontane forests (Farkas 2015).

Arthonia trilocularis Müll. Arg.

Distribution. Republic Guinea and Tanzania (Farkas 1987).

Bacidina mirabilis (Vězda) Vězda

Distribution. Widespread in tropical areas with rocky forests (Farkas 2015).

Bacidina scutellifera (Vězda) Vězda

Distribution. Widespread in tropical areas with dry evergreen and semi-evergreen forests, lowland forest, submontane forests, rocky forests (Farkas 2015).

Badimia cateilea (Vain.) Lücking, Lumbsch & Elix

Distribution. Widespread in tropical areas with lowland forests (Farkas 2015).

Bapalmuia palmularis (Müll. Arg.) Sérus.

Distribution. Widespread in tropical areas with submontane forests and rocky forests (Farkas 2015).

Brasilicia dimerelloides (Vězda) Farkas

Distribution. Widespread in tropical areas with submontane forests and rocky forests (Farkas 2015).

Bryoria bicolor (Hoffm.) Brodo & D. Hawksw.

Distribution. Mainly in high altitudes when in tropics; to the boreal regions. Distributed in Tanzania, Kenya and Uganda (Swinscow & Krog 1988).

Chemistry. Fumarprotocetraic acid (Swinscow & Krog 1988).

Bryoria fuscescens (Gyelin.) Brodo & D. Hawksw.

Distribution. Mainly in high altitudes when in tropics; to the arctic regions. Distributed in Tanzania, Kenya and Uganda (Swinscow & Krog 1988).

Chemistry. Fumarprotocetraic acid; protocetraic acid (Swinscow & Krog 1988).

Bryoria motykae (D. Hawksw.) Brodo & D. Hawksw.

Distribution. Distributed in Tanzania and Kenya (Swinscow & Krog 1988).

Chemistry. Fumarprotocetraic acid; protocetraic acid (Swinscow & Krog 1988).

Bryoria nadvornikiana (Gyelin.) Brodo & D. Hawksw.

Distribution. Mainly in high altitudes when in tropics to the boreal regions. Distributed in Tanzania, Kenya and Uganda (Swinscow & Krog 1988).

Chemistry. Alectorialic; barbatolic acid; fumarprotocetraic acid (Swinscow & Krog 1988).

Bulbothrix hypochraea (Vain.) Hale

Distribution. Distributed in Tanzania, Kenya and Uganda (Swinscow & Krog 1988).

Chemistry. Atranorin; salazinic acid (Swinscow & Krog 1988).

Bulbothrix isidiza (Nyl.) Hale

Distribution. A pantropical species.

Chemistry. Atranorin; salazinic acid (Swinscow & Krog 1988; Alstrup et al. 2010).

Bulbothrix aff. *meizospora* (Nyl.) Hale

Distribution. This is primarily an Asian species, distributed in Africa, India, Nepal and Pakistan (Alstrup et al. 2010).

Chemistry. Atranorin; salazinic acid (Swinscow & Krog 1988; Alstrup et al. 2010).

Bulbothrix pustulata (Hale) Hale

Distribution. The species is endemic to Africa (Alstrup et al. 2010).

Chemistry. Atranorin; salazinic acid (Alstrup et al. 2010).

Bulbothrix sensibilis (J. Steiner & Zahlbr.) Hale

Distribution. The species is found in Africa, India and South America (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Atranorin; salazinic acid (Swinscow & Krog 1988; Alstrup et al. 2010).

Bulbothrix suffixa (Stirt.) Hale

Distribution. The species is distributed in Kenya, Mauritius, South Africa, South and Central America (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Atranorin; gyrophoric acid (Swinscow & Krog 1988; Alstrup et al. 2010).

Bulbothrix tabacina (Mont. & Bosch) Hale

Distribution. A pantropical species (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Atranorin; consalazinic; salazinic acids (Swinscow & Krog 1988; Alstrup et al. 2010).

Bunodophoron melanocarpum (Sw.) Wedin

Distribution. Known from East Africa, reported as *Sphaerophorus melanocarpus* (Sw.) DC. (Swinscow & Krog 1988); Worldwide distributed in tropical to temperate oceanic areas (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Stictic acid aggregate (Swinscow & Krog 1988).

Byssolecania fumosnigricans (Müll. Arg.) R. Sant.

Distribution. Widespread in tropical areas with low land green forests, sub montane forests and rocky forests (Farkas 2015).

Byssoloma leucoblepharum (Nyl.) Vain.

Distribution. Widespread in tropical areas with low land green forests, sub montane forests and rocky forests (Farkas 2015).

Calicium chlorosporum F. Wilson

Distribution. A subtropical species. Widely distributed in Australia and also in mountainous areas of Africa with occurrences in Ethiopia, Kenya, Madagascar, the Mascarene Islands, South Africa and Uganda. Also found in Asia (India and Nepal), Australasia (Tibell 1987) and North America.

Calicium diploellum Nyl.

Distribution. In Africa; Tanzania and only reported from high altitude in Kenya (Tibell 2001). Also known from Europe (Alstrup et al. 2010).

Calicium hyperelloides Nyl.

Distribution. Earlier reported from 'East Africa'; Tanzania by Swinscow & Krog (1988). This species is widely distributed in Tanzania (Tibell 1981) for example in the Nguru Mts. in the Morogoro region. Later, (Tibell 2001) also reported from the Uluguru and Usambara Mts. Further occurrences are from Iringa Region (Idete, Udzungwa Mts, Massisiwe); Morogoro Region (Uluguru Mts, Luhangalo) were given by Alstrup et al. (2010) and, in addition, from the Iringa region, Udzungwa Mts., and Kilimanjaro region (Mt. Kilimanjaro) by Tibell & Frisch (2010). The species is widely distributed in tropical to warm temperate areas in Europe, Asia, the Americas, Australia and/or Asia.

Chemistry. Atranorin; consalazinic; salazinic acids, xanthones (Swinscow & Krog 1988; Alstrup et al. 2010).

Calicium lenticulare Ach.

Distribution. Widely distributed in temperate to warm temperate areas. Recorded from the Americas, Asia, Australasia and Europe. Previously reported from Burundi (Tibell 1981) as *C. subquercinum* Asah.

and from Kenya (Frisch & Hertel 1998) and Tanzania (Temu et al. 2019b).

Calicium pluriseptatum Tibell

Distribution. Only known from Tanzania (Tibell & Frisch 2010; Temu et al. 2019b) and Madagascar (Tibell & Frisch 2010).

Calicium salicinum Pers.

Distribution. Formally, reported from Kenya, Tanzania, Uganda by Swinscow & Krog (1988). In Tanzania, is found in Kilosa, Massisiwe and Morogoro Districts (Morogoro Region) of Tanzania (Tibell 1981; Alstrup et al. 2010). In Africa, occurring at moderate to high altitudes from Algeria to South Africa (Kenya, Malawi, Tanzania, Uganda; Tibell 2001). Widely distributed in cool to temperate areas of both hemispheres (Europe, Asia, the Americas, and Australasia).

Chemistry. Norstictic acids (Swinscow & Krog 1988; Alstrup et al. 2010).

Catapyrenium psoromoides (Borrer) R. Sant.

Distribution. Tanzania, Europe, North America and New Zealand (Swinscow & Krog 1988).

Coccocarpia adnata L. Arv.

Distribution. Tanzania, Kenya, Phillipines, Pacific Islands (Alstrup & Christensen 2006).

Coccocarpia dissecta Swinscow & Krog

Distribution. Tanzania, Kenya, Phillipines, Pacific Islands (Swinscow & Krog 1988; Alstrup & Christensen 2006).

Coccocarpia erythroxyli (Spreng.) Swinscow & Krog

Distribution. Tanzania, Kenya, Uganda. Widespread throughout tropical and temperate regions with some areas of arctic (Swinscow & Krog 1988).

Coccocarpia flavicans L. Arv.

Distribution. Angola Tanzania, Kenya and S America (Alstrup & Christensen 2006).

Coccocarpia palmicola (Sprengel) L. Arv. & D. Gall

Distribution. Angola Tanzania, Kenya and S America (Alstrup & Christensen 2006).

Coccocarpia pellita (Ach.) Müll. Arg.

Distribution. The species is widespread in the tropics (Alstrup & Christensen 2006).

Calopadia editae Vězda ex Chaves & Lücking

Distribution. Widespread in tropical areas with dry and semi-evergreen forests, submontane forests and rocky forests (Farkas 2015).

Calopadia puiggarii (Müll. Arg.) Vězda

Distribution. Widespread in tropical areas with dry and semi-evergreen forests, submontane forests and rocky forests (Farkas 2015).

Candelaria concolor (Dicks.) Arnold

Distribution. Widespread in tropical and temperate regions (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Calycin; pulvinic acid; (Swinscow & Krog 1988; Alstrup et al. 2010).

Candelaria fibrosa (Fr.) Müll. Arg.

Distribution. Widespread in tropical and subtropical areas (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Calycin; pulvinic acid (Swinscow & Krog 1988).

Canoparmelia caroliniana (Nyl.) Elix & Hale

Distribution. East, West and Southern Africa, Americas, Thailand (Swinscow & Krog 1988).

Chemistry. Atranorin; divaricatic acid; perlatolic acid (Swinscow & Krog 1988).

Canoparmelia crozalsiana (de Lesd.) Elix & Hale

Distribution. Kenya, Tanzania, West Africa, Americas, Taiwan (Swinscow & Krog 1988).

Chemistry. Atranorin; stictic acid aggregate (Swinscow & Krog 1988).

Canoparmelia concrescens (Vain.) Elix & Hale

Distribution. Distributed in East Africa and South Africa (Hale 1976). The species has a distribution restricted to Africa (Alstrup et al. 2010).

Chemistry. Atranorin; divaricatic acid (Alstrup et al. 2010).

Canoparmelia zimbabwensis (Hale) Elix & Hale

Distribution. It is endemic to Africa. It is known in East and South Africa (Alstrup et al. 2010).

Chemistry. Atranorin; protocetraric acid (Alstrup et al. 2010).

Cetraria aculeata (Schreb.) Fr.

Distribution. East Africa. The species has a worldwide distribution, especially in colder areas (Alstrup et al. 2010).

Chemistry. Protolichesterinic acid (Swinscow & Krog 1988).

Cetrelia braunsiana (Müll. Arg.) Zahlbr.

Distribution. Kenya, Asia and New Zealand.

Chemistry. Aleatoronic; atranorin; α -collatolic acids (Alstrup et al. 2010).

Chaenotheca chloroxantha Tibell

Distribution. Only known from Africa; Kenya, South Africa and Tanzania (Arusha) (Tibell 2001; Temu et al. 2019b).

Chaenotheca confusa Tibell

Distribution. In Tanzania, it was first recorded on the Southwest slope of Mt. Meru (Tibell 2001; Temu et al. 2019b). Known from South America.

Chaenotheca deludens Tibell

Distribution. In Tanzania, is found in Kilimanjaro Region, Mt. Kilimanjaro forest (Tibell 1981; Temu et al. 2019b). Widely distributed and also known from Europe, Asia and South America.

Chaenotheca furfuracea (L.) Tibell

Distribution. In Tanzania (Arusha region) (Tibell 2001; Temu et al. 2019b). In Africa, is known from moderate to high altitudes in Rwanda, Tanzania and Zaire (Tibell 2001). Also, in the Northern and Southern Hemispheres. Earlier reported from 'East Africa' by Swinscow & Krog (1988).

Chemistry. Pulvinic acid; vulpinic acid (Swinscow & Krog 1988).

Chaenotheca hispidula (Ach.) Zahlbr.

Distribution. Widely distributed in Eurasia, the Americas and Australasia, Tanzania (Temu et al. 2019b).

Chaenotheca hygrophila Tibell

Distribution. In Tanzania; Iringa Region (Udzungwa Mts.) (Alstrup et al. 2010); East Africa (Swinscow & Krog 1988). Widely distributed in Europe, Asia, North America, and Australasia.

Chaenotheca olivaceorufa (Vain.) Zahlbr.

Distribution. Africa (Tanzania, Kilimanjaro Region, Kilimanjaro) (Alstrup et al. 2010). Widely distributed in Central and South America and Australasia.

Chaenotheca sphaerocephala Nád. v.

Distribution. Tanzania (Tibell & Frisch 2010).

Chaenotheca stemonea (Ach.) Müll. Arg.

Distribution. Tanzania (Tibell & Frisch 2010); Africa (Rwanda) (Killmann & Fischer 2005).

Chaenotheca trichialis (Ach.) Th. Fr.

Distribution. Tanzania (Kilimanjaro Region; Mt. Kilimanjaro forest) (Tibell & Frisch 2010); Africa (Zaire, Kenya and Rwanda) (Tibell & Frisch 2010). Widely distributed in temperate areas of both the Northern and Southern Hemisphere (Eurasia, Americas and Australasia). In areas of low latitudes only on high mountains.

**Chaenothecopsis debilis* (Sm.) Tibell

Distribution. Widely distributed in both hemispheres. Africa; Algeria (Tibell 2001).

**Chaenothecopsis kilimanjaroensis* Temu & Tibell

Distribution. Only known from the type locality (Arusha, Tanzania).

**Chaenothecopsis pilosa* Tibell & Kalb

Distribution. Widely distributed in the tropics. In Tanzania, Mt. Meru, Arusha region (Tibell & Rayman 1995). Further known from Papua New Guinea, Guatemala, Peru and Brazil.

Cladonia bacillaris Nyl.

Distribution. Cosmopolitan species; distributed in Kenya and Uganda (Swinscow & Krog 1988).

Chemistry. Atranorin; barbatic acid; didymic acid; (Swinscow & Krog 1988).

Cladonia caespiticia (Pers.) Flörke

Distribution. Widely spread in northern hemisphere; also, Tanzania and Uganda (Swinscow & Krog 1988).

Chemistry. Fumarprotocetraic acid (Swinscow & Krog 1988).

Cladonia cenotea (Ach.) Schaer.

Distribution. Widely spread in northern hemisphere; also, Tanzania, Kenya and Uganda (Swinscow & Krog 1988).

Chemistry. Barbatic acid; thamnolic acid; (Swinscow & Krog 1988).

Cladonia centrophora Müll. Arg.

Distribution. Tanzania and South Africa (Swinscow & Krog 1988).

Chemistry. Fumarprotocetraic acid (Swinscow & Krog 1988).

Cladonia chlorophaea (Flörke ex Sommerf.) Spreng.

Distribution. Cosmopolitan species, spread in Tanzania, Kenya and Uganda (Swinscow & Krog 1988).

Chemistry. Fumarprotocetraic acid (Swinscow & Krog 1988).

Cladonia confusa R. Sant.

Distribution. Tanzania, distributed in the tropics and subtropics of southern hemisphere (Swinscow & Krog 1988).

Chemistry. Perlatolic acid; usnic acid (Swinscow & Krog 1988).

Cladonia crispata (Ach.) Flotow

Distribution. Cosmopolitan species, spread in Tanzania and Kenya (Swinscow & Krog 1988).

Chemistry. Barbatic acid; squamatic acid; (Swinscow & Krog 1988).

Cladonia didyma (Fée) Vain.

Distribution. Predominantly in tropical regions (Swinscow & Krog 1988).

Chemistry. Barbatic acid; didymic acid; thamnolic acid (Swinscow & Krog 1988).

Cladonia digitata (L.) Baumg.

Distribution. Widely distributed in northern hemisphere. Found in Kenya Tanzania and Uganda (Swinscow & Krog 1988).

Chemistry. Thamnolic acid (Swinscow & Krog 1988).

Cladonia diplotypa Nyl.

Distribution. Found in Kenya Tanzania and Uganda, Cameroon, Rwanda, Zaire (Swinscow & Krog 1988).

Chemistry. Thamnolic acid (Swinscow & Krog 1988).

Cladonia hedbergii Ahti

Distribution. Widely distributed central Africa. Found in Kenya Tanzania and Uganda (Swinscow & Krog 1988).

Chemistry. Barbatic acid; thamnolic acid (Swinscow & Krog 1988).

Cladonia intermediella Vain.

Distribution. Kenya Tanzania and Uganda, Mauritius (Swinscow & Krog 1988).

Chemistry. Fumarprotocetraic acid (Swinscow & Krog 1988).

Cladonia krempehuberi (Vain.) Zahlbr.

Distribution. Widely distributed in northern hemisphere. Found in Kenya, Tanzania and Uganda (Swinscow & Krog 1988).

Chemistry. Atranorin; fumarprotocetraic acid (Swinscow & Krog 1988).

Cladonia leucophylla Ahti & Krog

Distribution. Found in Kenya and Tanzania (Swinscow & Krog 1988).

Chemistry. Fumarprotocetraic acid; homosekiaic acid; sekikaic acid (Swinscow & Krog 1988).

Cladonia macilenta Hoffm.

Distribution. Cosmopolitan species. Found in Kenya Tanzania and Uganda (Swinscow & Krog 1988).

Chemistry. Barbatic acid; didymic acid; thamnolic acid (Swinscow & Krog 1988).

Cladonia medusina (Bory) Nyl.

Distribution. Tanzania, Madagascar (Swinscow & Krog 1988).

Chemistry. Squamatic acid; usnic acid (Swinscow & Krog 1988).

Cladonia ochrochlora Flörke

Distribution. Cosmopolitan species. Found in Kenya and Tanzania (Swinscow & Krog 1988).

Chemistry. Fumarprotocetraic acid (Swinscow & Krog 1988).

Cladonia pachyclados (Vain.) Ahti

Distribution. Kenya, Tanzania, Malawi, Madagascar (Swinscow & Krog 1988).

Chemistry. Grayanic acid; usnic acid (Swinscow & Krog 1988).

Cladonia pallens Ahti & Krog

Distribution. Tanzania (Swinscow & Krog 1988).

Chemistry. Thamnolic acid (Swinscow & Krog 1988).

Cladonia parva Ahti & Krog

Distribution. Tanzania (Swinscow & Krog 1988).

Chemistry. Didymic acid; psoromic acid (Swinscow & Krog 1988).

Cladonia pocillum (Ach.) O.J. Rich.

Distribution. Cosmopolitan species. Found in Kenya, Tanzania and Uganda (Swinscow & Krog 1988).

Chemistry. Fumarprotocetraic acid; psoromic acid (Swinscow & Krog 1988).

Cladonia poeciloclada Abbayes

Distribution. Kenya, Tanzania and Uganda, South Africa (Swinscow & Krog 1988).

Chemistry. Fumarprotocetraic acid; homosekikaic acid (Swinscow & Krog 1988).

Cladonia pyxidata (L.) Hoffm.

Distribution. Cosmopolitan species. Found in Kenya, Tanzania and Uganda (Swinscow & Krog 1988).

Chemistry. Fumarprotocetraic acid (Swinscow & Krog 1988).

Cladonia ramulosa (With.) J.R. Laundon

Distribution. Cosmopolitan species. Found in Kenya, Tanzania and Uganda (Swinscow & Krog 1988).

Chemistry. Fumarprotocetraic acid with or without homosekikaic acid (Swinscow & Krog 1988).

Cladonia rei Schaer.

Distribution. Cosmopolitan species. Found in Kenya, Tanzania and Uganda (Swinscow & Krog 1988).

Chemistry. Fumarprotocetraic acid; homosekikaic acid (Swinscow & Krog 1988).

Cladonia squamosa Hoffm.

Distribution. Cosmopolitan species. Found in Kenya, Tanzania and Uganda (Swinscow & Krog 1988).

Chemistry. Barbatic acid; squamatic acid (Swinscow & Krog 1988).

Cladonia submultiformis Asahina

Distribution. Tanzania (Swinscow & Krog 1988).

Chemistry. Atranorin; fumarprotocetraic acid; homosekikaic acid (Swinscow & Krog 1988).

Cladonia subpityrea Sandst.

Distribution. Tanzania, Uganda, Central Africa, Madagascar, Southeast Asia (Swinscow & Krog 1988).

Chemistry. Psoromic acid (Swinscow & Krog 1988).

Cladonia subradiata (Vain.) Sandst.

Distribution. Tropical and warm temperate region species. Found in Kenya, Tanzania and Uganda (Swinscow & Krog 1988).

Chemistry. Fumarprotocetraic acid (Swinscow & Krog 1988).

Cladonia subsquamosa Kremp.

Distribution. Kenya, Tanzania and Uganda, South America (Swinscow & Krog 1988).

Chemistry. Fumarprotocetraic acid (Swinscow & Krog 1988).

Cladonia umbellata Ahti & Krog

Distribution. Tanzania (Swinscow & Krog 1988).

Chemistry. Norstictic acid (Swinscow & Krog 1988).

Cladonia usambarensis Ahti & Krog

Distribution. Tanzania (Swinscow & Krog 1988).

Chemistry. Barbatic acid; usnic acid; thamnolic acid (Swinscow & Krog 1988).

Cladonia varians Ahti & Krog

Distribution. Tanzania, Rodriguez Island (Swinscow & Krog 1988).

Chemistry. Barbatic acid; usnic acid; thamnolic acid; triterpenoids (Swinscow & Krog 1988).

Coccocarpia palmicola (Spreng.) Arv. & D.J. Galloway

Distribution. Kenya, Tanzania and Uganda with distribution in tropics, subtropics to warm temperate regions (Swinscow & Krog 1988).

Coccocarpia pellita (Ach.) Müll. Arg.

Distribution. Kenya, Tanzania and Uganda with distribution in tropics (Swinscow & Krog 1988).

Coenogonium poscii (Vězda & Farkas) Lücking, Aptroot & Sipman

Distribution. Widespread in tropical areas with submontane forests (Farkas 2015).

Coenogonium subluteum (Rehm) Kalb & Lücking

Distribution. Widespread in tropical areas with submontane forests (Farkas 2015).

Collema callibotrys Tuck.

Distribution. Tropical and warm temperate region species. Found in Kenya, Tanzania and Uganda (Swinscow & Krog 1988; Alstrup & Christensen 2006).

Collema coilocarpum (Müll. Arg.) Zahlbr.

Distribution. Tanzania. The species is known from Kenya, tropical Asia and Pacific Islands (Paleotropical) (Alstrup & Christensen 2006).

Collema furfuraceum (Arnold) Du Rietz

Distribution. Boreal, tropical and warm temperate region species. Found in Kenya and Tanzania (Swinscow & Krog 1988; Alstrup & Christensen 2006).

Collema glaucophthalmum Nyl.

Distribution. Known from Mexico, Tanzania. Spread in tropical and warm temperate regions (Swinscow & Krog 1988).

Collema kauaiense Degel.

Distribution. Tropical and temperate region species. Found in Tanzania and Uganda (Swinscow & Krog 1988).

Collema laevisporum Swinscow & Krog

Distribution. Tanzania and Uganda (Swinscow & Krog 1988).

Collema leptaleum Tuck.

Distribution. Tropical and temperate region species. Kenya, Tanzania and Uganda (Swinscow & Krog 1988).

Collema pulcellum Ach.

Distribution. Tropical and temperate region species. Found in Kenya, Tanzania and Uganda (Swinscow & Krog 1988; Alstrup & Christensen 2006).

Collema rugosum Kremp.

Distribution. Widespread in the tropical zone of Asia and Pacific Islands, in E Africa known from Kenya and Uganda (Paleotropical) (Alstrup & Christensen 2006).

Collema subflaccidum Degel.

Distribution. Tanzania, a cosmopolitan species (Alstrup & Christensen 2006).

Collema subnigrescens Degel.

Distribution. Tanzania, western Europe and Madeira, South Africa (Degelius 1974), Algeria and Tunisia (Degelius 1954). The distribution pattern is broadly Atlantic (Alstrup & Christensen 2006).

Collema uviforme Hue.

Distribution. Kenya and Tanzania (Swinscow & Krog 1988), Ethiopia (Alstrup & Christensen 2006).

Crespoa crozalsiana (B. de Lesd. ex Harm.) Lendemer & B.P. Hodk.

Distribution. This is a widely distributed species known from Africa, America, Asia and Europe.

Chemistry. Atranorin; stictic acid (Alstrup et al. 2010).

Crocodia aurata (Ach.) Link

Distribution. The species is known from East Africa and in the tropics and temperate regions (Swinscow & Krog 1988).

Dermaticum thunbergii (Ach.) Nyl.

Distribution. Tanzania, Southern Africa (Swinscow & Krog 1988).

Chemistry. Gyrophoric acid; rhizocarpic acid; usnic acid (Swinscow & Krog 1988).

Dermatocarpon aequinoctiale (Hochst. ex Flot.) Müll. Arg.

Distribution. Kenya, Tanzania and Uganda (Swinscow & Krog 1988).

Dibaeis baeomyces (L. fil.) Rambold & Hertel

Distribution. Found in the tropics to cool temperate regions of Tanzania, Kenya and Uganda (Swinscow & Krog 1988). Widespread in temperate to low arctic regions (Alstrup et al. 2010).

Chemistry. Baeomycesic acid (Swinscow & Krog 1988).

Dictyonema sericeum (Sw.) Berk.

Distribution. Kenya, Tanzania; distribution in tropics (Swinscow & Krog 1988).

Dirinaria aegialita (Afzel. ex Ach.) B.J. Moore

Distribution. A pantropical species (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Atranorin; divaricatic acid; triterpenoids (Swinscow & Krog 1988).

Dirinaria applanata (Fée) D.D. Awasthi

Distribution. The species has a pantropical distribution (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Atranorin; divaricatic acid; triterpenoids (Swinscow & Krog 1988).

Dirinaria complicata D.D. Awasthi

Distribution. Kenya, Tanzania, Uganda and Madagascar (Swinscow & Krog 1988).

Chemistry. Divaricatic acid; triterpenoids (Swinscow & Krog 1988).

Dirinaria confluens (Fr.) D.D. Awasthi

Distribution. Widespread in tropical and warm temperate regions (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Atranorin; divaricatic acid; triterpenoids (Swinscow & Krog 1988).

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

Distribution. Kenya, Tanzania, Mozambique (Swinscow & Krog 1988).

Chemistry. Atranorin; divaricatic acid; triterpenoids (Swinscow & Krog 1988).

Dirinaria leopoldii (Stein) D.D. Awasthi

Distribution. Kenya, Tanzania, western, central and southern Africa, tropical and subtropical America (Swinscow & Krog 1988).

Chemistry. Atranorin; sekikaic acid; triterpenoids (Swinscow & Krog 1988).

Dirinaria picta (Sw.) Clem. & Shear

Distribution. Worldwide in tropical and subtropical regions (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Atranorin; divaricatic acid; triterpenoids (Swinscow & Krog 1988).

Enterographa effusa Vězda

Distribution. Tanzania (Farkas 1987).

Ephebe ocellata Henssen

Distribution. Tanzania, New Zealand, Asia North America (Swinscow & Krog 1988).

Erioderma meiocarpum Nyl.

Distribution. Kenya, Tanzania, Uganda, Rwanda, Zambia, Asia (Swinscow & Krog 1988).

Chemistry. Argopsin acid; norargopsin (Swinscow & Krog 1988).

Erioderma solediatum D.J. Galloway & P.M. Jørg.

Distribution. Tanzania, widely spread in tropics and subtropics (Swinscow & Krog 1988).

Chemistry. Eriodermin; viciacin (Swinscow & Krog 1988).

Erioderma unguigerum (Bory) Nyl.

Distribution. Tanzania, widely spread in tropics (Swinscow & Krog 1988).

Chemistry. Eriodermin; viciacin (Swinscow & Krog 1988).

Eschatogonia prolifera (Mont.) R. Sant.

Distribution. Kenya, Tanzania, West Africa, tropical America (Swinscow & Krog 1988).

Chemistry. 4-O-methylnorhomosekikaic acid; Sekikaic acid; zeorin (Swinscow & Krog 1988).

Fellhanera bouteillei (Desm.) Vězda

Distribution. Widespread in tropical areas with low land forests and sub montane forests (Farkas 2015).

Fellhanera sublecanorina (Nyl.) Vězda

Distribution. Widespread in tropical areas with low land forests and sub montane forests (Farkas 2015).

Flavoparmelia amplexa (Stirton) Hale

Distribution. Kenya, Tanzania, West Africa, Americas, Taiwan (Swinscow & Krog 1988).

Chemistry. Atranorin; protocetraric acid (Swinscow & Krog 1988).

Flavoparmelia caperata (L.) Hale

Distribution. East Africa, this is a cosmopolitan, mainly temperate species (Swinscow & Krog 1988).

Chemistry. Caperatic acid; protocetraric acid; usnic acid (Alstrup et al. 2010).

Flavoparmelia soledians (Nyl.) Hale

Distribution. East and southern Africa, South America, Europe, New Zealand (Swinscow & Krog 1988).

Chemistry. Protocetraric acid; salazinic acid; usnic acid (Swinscow & Krog 1988).

Flavopunctelia flaventior (Stirt.) Hale

Distribution. East Africa; widespread in tropical and temperate regions (Swinscow & Krog 1988).

Chemistry. Atranorin; lecanoric acid; usnic acid (Swinscow & Krog 1988).

Fouragea filicina (Mont.) Trevis.

Distribution. Widespread in tropical areas with low land forests, sub montane forests and rocky forests (Farkas 2015).

Fouragea viridistellata (Sérus., Lücking & Sparrius) Ertz & Frisch

Distribution. Widespread in tropical areas with rocky forests (Farkas 2015).

Fuscopannaria leucosticta (Tuck.) P.M. Jørg.

Distribution. Pantropical species. Tanzania, South East Asia, south to New Guinea, South Europe (Italy), the West Indies and South East U.S.A., Great Lakes (Jørgensen 2000), temperate areas of Europe and North America (Alstrup & Christensen 2006).

Gyalectidium caucasicum (Elenkin & Woron.) Vězda

Distribution. Widespread in tropical areas with dry and semi-evergreen forest, lowland forests and sub-montane forests (Farkas 2015).

Gyalectidium filicinum Müll. Arg.

Distribution. Widespread in tropical areas with dry and semi-evergreen forest and submontane forests (Farkas 2015).

Heterocyphelium leucampyx (Tuck.) Vain.

Distribution. Tanzania; Morogoro Region (Udzungwa Mts.) (Tibell & Frisch 2010), but from Africa previously known from the Ivory Coast (Tibell 2001). Also occurs in Australia and South America (Alstrup et al. 2010).

Heterocyphelium triseptatum Aptroot & M. Cacéres

Distribution. Brazil, Tanzania (Aptroot et al. 2017).

Herpothallon hypoprotocetraricum G. Thor

Distribution. Tanzania (Aptroot et al. 2009).

Heterodermia appendiculata (Kurok.) Swinscow & Krog

Distribution. Tanzania, Ivory Coast, Australia, New Zealand (Swinscow & Krog 1988). It is known from South Africa and Chile (Swinscow & Krog 1988).

Chemistry. Atranorin; norstictic acid; zeorin (Swinscow & Krog 1988).

Heterodermia chilensis (Kurok.) Swinscow & Krog

Distribution. Kenya (Swinscow & Krog 1988). It is known from South Africa and Chile (Alstrup et al. 2010).

Chemistry. Atranorin; zeorin (Swinscow & Krog 1988).

Heterodermia comosa (Kurok.) Swinscow & Krog

Distribution. This is a widespread tropical species (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Atranorin; zeorin (Swinscow & Krog 1988).

Heterodermia dactyliza (Nyl.) Swinscow & Krog

Distribution. Tanzania, Uganda, South America. This is a widespread tropical species (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Atranorin; zeorin (Swinscow & Krog 1988).

Heterodermia diademata (Taylor) D.D. Awasthi

Distribution. Circumpolar tropical distribution (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Atranorin; zeorin (Swinscow & Krog 1988).

Heterodermia hypoleuca (Ach.) Trevis.

Distribution. East Africa, Asia and North America (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Atranorin; zeorin (Swinscow & Krog 1988).

Heterodermia isidiophora (Vain.) D.D. Awasthi

Distribution. Pantropical (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Atranorin; zeorin (Swinscow & Krog 1988).

Heterodermia japonica (M. Satô) Swinscow & Krog

Distribution. Africa, Asia, New Zealand (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Atranorin; norstictic acid; zeorin (Swinscow & Krog 1988).

Heterodermia lepidota Swinscow & Krog

Distribution. The species was known from Ethiopia, Kenya and Uganda (Swinscow & Krog 1988).

Chemistry. Atranorin; zeorin (Swinscow & Krog 1988).

Heterodermia leucomela (L.) Poelt

Distribution. A pantropical to warm-temperate species (Alstrup et al. 2010; Swinscow & Krog 1988).

Chemistry. Atranorin; norstictic acid; salazinic acid; triterpenoids; zeorin (Swinscow & Krog 1988).

Heterodermia loriformis (Kurok.) Swinscow & Krog

Distribution. A pantropical to warm-temperate species (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Atranorin; zeorin (Swinscow & Krog 1988).

Heterodermia lutescens (Kurok.) Follmann

Distribution. Wide spread in tropics and subtropics. Kenya, Tanzania and Uganda (Swinscow & Krog 1988).

Chemistry. Atranorin; zeorin (Swinscow & Krog 1988).

Heterodermia microphylla (Kurok.) Skorepa

Distribution. East Africa, Asia and New Zealand (Alstrup et al. 2010).

Heterodermia obscurata (Nyl.) Trevis.

Distribution. A pantropical species extending into the temperate zone (Alstrup et al. 2010; Swinscow & Krog 1988).

Chemistry. Atranorin; norstictic acid; salazinic acid; triterpenoids; zeorin (Swinscow & Krog 1988).

Heterodermia podocarpa (Bél.) D.D. Awasthi

Distribution. Kenya, North America, Asia and Australia (Swinscow & Krog 1988).

Chemistry. Atranorin; norstictic acid; salazinic acid; triterpenoids; zeorin (Swinscow & Krog 1988).

Heterodermia pseudospeciosa (Kurok.) W.L. Culb.

Distribution. Kenya, North America, Asia and Australia (Alstrup et al. 2010; Swinscow & Krog 1988).

Chemistry. Atranorin; norstictic acid; salazinic acid; zeorin (Swinscow & Krog 1988).

Heterodermia speciosa (Wulfen) Trevis.

Distribution. This is a widespread species in tropical to warm temperate regions (Alstrup et al. 2010; Swinscow & Krog 1988).

Chemistry. Atranorin; zeorin (Swinscow & Krog 1988).

Heterodermia usambarensis (Kurok.) Swinscow & Krog

Distribution. Tanzania (Swinscow & Krog 1988).

Chemistry. Atranorin; zeorin (Swinscow & Krog 1988).

Heterodermia vulgaris (Vain.) Follmann & Redón

Distribution. Tanzania, Kenya, Uganda, South Africa, tropical America (Swinscow & Krog 1988).

Chemistry. Atranorin; zeorin (Swinscow & Krog 1988).

Hyperphyscia adglutinata (Flörke) H. Mayrhofer & Poelt

Distribution. Widespread in tropical to temperate regions (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Skyrin (Swinscow & Krog 1988).

Hyperphyscia granulata (Poelt) Moberg

Distribution. Kenya, Tanzania, Uganda, Zambia, Asia (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Skyrin (Swinscow & Krog 1988).

Hyperphyscia pandani (H. Magn.) Moberg

Distribution. East Africa and Pacific Islands (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Skyrin (Swinscow & Krog 1988).

Hyperphyscia syncolla (Tuck. ex Nyl.) Kalb

Distribution. East Africa, the Americas, and Asia (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Skyrin (Swinscow & Krog 1988).

Hyperphyscia tuckermanii (Lynge) Moberg

Distribution. The species was known from Kenya and South America (Alstrup et al. 2010).

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

Distribution. Tanzania (Swinscow & Krog 1988).

Chemistry. Alectoronic; atranorin; echinocarpic acid (Swinscow & Krog 1988).

Hypotrachyna afrorevoluta (Krog & Swinscow) Krog & Swinscow

Distribution. Widely distributed in tropical regions; Kenya, Tanzania and Uganda.

Chemistry. Atranorin; gyrophoric acid (Swinscow & Krog 1988).

Hypotrachyna brevirhiza (Kurok.) Hale

Distribution. Widely distributed in tropical regions. Known from Australia, southeast Asia South America, Kenya and Tanzania.

Chemistry. Atranorin; salazinic acid (Swinscow & Krog 1988; Alstrup et al. 2010).

Hypotrachyna costaricensis (Nyl.) Hale

Distribution. Widely distributed in tropical regions.

Chemistry. Atranorin (Swinscow & Krog 1988).

Hypotrachyna densirhizinata (Kurok.) Hale

Distribution. Kenya, Tanzania, Uganda Central and South America, West Indies.

Chemistry. Alectoronic acid; atranorin (Swinscow & Krog 1988; Alstrup et al. 2010).

Hypotrachyna ducalis (Jatta) Hale

Distribution. Kenya, Tanzania, Uganda, Central Africa, Asia.

Chemistry. Atranorin; barbatic acid; obtusatic acid (Swinscow & Krog 1988).

Hypotrachyna endochlora (Leight.) Hale

Distribution. Kenya, Tanzania, Uganda, South Africa, Europe, tropical America, Hawaii (Swinscow & Krog 1988).

Chemistry. Atranorin; barbatic acid; obtusatic acid; secalonic acid; echinocarpic acid (Swinscow & Krog 1988).

Hypotrachyna formosana (Zahlbr.) Hale

Distribution. Kenya, Tanzania, Uganda, Asia, Central and South America, India, New Zealand (Swinscow & Krog 1988).

Chemistry. Protocetraric acid; skyrin (Swinscow & Krog 1988).

Hypotrachyna gondylophora (Hale) Hale

Distribution. The species is known from East Africa, the southern United States and tropical America (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Atranorin; fumarprotocetraric acid; skyrin (in traces) (Swinscow & Krog 1988; Alstrup et al. 2010).

Hypotrachyna immaculata (Kurok.) Hale

Distribution. The species is known from East and South Africa, the south America, Australia (Swinscow & Krog 1988).

Chemistry. Atranorin; lividic acid; skyrin (Swinscow & Krog 1988).

Hypotrachyna laevigata (Sm.) Hale

Distribution. East Africa, Europe, the Americas and New Zealand (Swinscow & Krog 1988).

Chemistry. Atranorin; barbatic acid; obtusatic acid (Swinscow & Krog 1988).

Hypotrachyna leiophylla (Kurok.) Hale

Distribution. Kenya, Tanzania South Africa (Swinscow & Krog 1988).

Chemistry. Atranorin; skyrin (Swinscow & Krog 1988).

Hypotrachyna minarum (Vain.) Krog & Swinscow

Distribution. A species of worldwide distribution in tropical and temperate regions (Swinscow & Krog 1988).

Hypotrachyna neodissecta (Hale) Hale

Distribution. It has a pantropical distribution.

Chemistry. Atranorin; gyrophoric acid (Alstrup et al. 2010; Swinscow & Krog 1988).

Hypotrachyna neodamaziana (Elix & J. Johnst.) Divakar, A. Crespo, Sipman, Elix & Lumbsch

Distribution. The species is known from Kenya, South America and Australia.

Chemistry. Atranorin; gyrophoric acid (Alstrup et al. 2010).

Hypotrachyna novella (Vain.) Hale

Distribution. East African, Brazil and Venezuela (Hale 1975).

Chemistry. Colensoinic acid; lichexanthone; lividic; norcolensoinic acid; 4-O-demethyl- physodic acid; physodic acids (Alstrup et al. 2010).

Hypotrachyna orientalis (Hale) Hale

Distribution. East Africa and Asia (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Atranorin; barbatic acid; 4-O-demethyl-barbatic acid; traces of obtusatic; norobtusatic acids (Swinscow & Krog 1988; Alstrup et al. 2010).

Hypotrachyna osseoalba (Vainio) Park & Hale

Distribution. Widely distributed in subtropical and temperate regions.

Chemistry. Lichenoxanthone; lividic acids; physodic (Alstrup et al. 2010).

Hypotrachyna physcioides (Nyl.) Hale

Distribution. East Africa, Asia, Australia, central, South America and Sonoran Desert region.

Chemistry. Atranorin; barbatic, 4-O-demethyl barbatic; obtusatic; echinocarpic acids (Alstrup et al. 2010).

Hypotrachyna polydactyla (Krog & Swinscow) T.H. Nash

Distribution. The species is known from East Africa and North America.

Chemistry. Atranorin; lividic acid complex; skyrin (Swinscow & Krog 1988; Alstrup et al. 2010).

Hypotrachyna revoluta (Flörke) Hale

Distribution. Widespread in temperate and tropical regions.

Chemistry. Atranorin; gyrophoric acid (Swinscow & Krog 1988; Alstrup et al. 2010).

Hypotrachyna rockii (Zahlbr.) Hale

Distribution. Widespread in subtropical and warm temperate zones, montane in East Africa.

Chemistry. Atranorin; evernic; lecanoric acids (Swinscow & Krog 1988; Alstrup et al. 2010).

Hypotrachyna scytophylla (Kurok.) Hale

Distribution. Kenya, Tanzania and Asia (Swinscow & Krog 1988).

Chemistry. Atranorin; echinocarpic acid; gyrophoric acid (Swinscow & Krog 1988).

Hypotrachyna sinuosa (Sm.) Hale

Distribution. East Africa, worldwide in temperate and higher altitude (Swinscow & Krog 1988).

Chemistry. Norstictic acid; salazinic acid; usnic acid (Swinscow & Krog 1988).

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

Distribution. Found in Tanzania; distributed in Kenya and Uganda in tropical and regions with warm temperature (Swinscow & Krog 1988).

Chemistry. Atranorin; protolichenic acid; salazinic acid (Swinscow & Krog 1988).

Hypotrachyna spathulata (Kurok.) Krog & Swinscow

Distribution. Kenya, Tanzania and Southern Africa (Swinscow & Krog 1988).

Chemistry. Atranorin; gyrophoric acid (Swinscow & Krog 1988).

Hypotrachyna subfaticens (Kurok.) Krog & Swinscow

Distribution. Eastern and Southern Africa (Swinscow & Krog 1988).

Chemistry. Atranorin (Swinscow & Krog 1988).

Hypotrachyna spumosa (Asahina) Krog & Swinscow

Distribution. A widespread tropical species.

Chemistry. Atranorin; gyrophoric acid (Alstrup et al. 2010).

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

Distribution. Kenya, Tanzania, Asia as well as Central and South America.

Chemistry. Atranorin; salazinic acid (Alstrup et al. 2010).

Imshaugia aleurites (Ach.) S.L.F. Mey.

Distribution. Widespread in temperate and boreal regions, montane in Africa. Already known from Kenya and Tanzania (Alstrup et al. 2010).

Kroswia crystallifera P.M. Jørg.

Distribution. Paleotropical species. Tanzania (Alstrup & Christensen 2006), India, tropical to subtropical areas of Africa, South India and Taiwan (Jørgensen 2002).

Lasallia pustulata (L.) Mérat

Distribution. Kenya, Tanzania, South Africa, Europe, the Americas, Asia (Swinscow & Krog 1988).

Chemistry. Gyrophoric acid (Swinscow & Krog 1988).

Lepidocollema marianum (Fr.) P.M. Jørg.

Distribution. East Africa with wide distribution in tropics (Swinscow & Krog 1988).

Lepidocollema stylophorum (Vain.) P.M. Jørg

Distribution. Tanzania, West Indies, Philippines, Australia (Swinscow & Krog 1988).

Leprocaulon arbuscula (Nyl.) Nyl.

Distribution. Kenya, Tanzania, Rwanda, Mauritius, Australasia, the Americas, Asia, Cuba (Swinscow & Krog 1988).

Chemistry. Gyrophoric acid (Swinscow & Krog 1988; Alstrup et al. 2010).

Leptogium adpressum Nyl.

Distribution. Kenya, Tanzania, Uganda, India, North America (Swinscow & Krog 1988).

Leptogium asiaticum P.M. Jørg.

Distribution. Kenya, Tanzania, Asia, Australia (Swinscow & Krog 1988).

Leptogium austroamericanum (Malme) C.W. Dodge

Distribution. Kenya, Tanzania, North and South America (Swinscow & Krog 1988; Alstrup & Christensen 2006).

Leptogium azureum (Sw.) Mont.

Distribution. East Africa. Mostly spread in tropical and temperate regions (Swinscow & Krog 1988; Alstrup & Christensen 2006).

Leptogium burgessii (L.) Mont.

Distribution. East Africa. Mostly spread in tropical and temperate regions (Swinscow & Krog 1988).

Leptogium burnetiae C.W. Dodge

Distribution. East Africa. Mostly spread in tropical and temperate regions (Swinscow & Krog 1988; Alstrup & Christensen 2006).

Leptogium caespitosum (Taylor) Swinscow & Krog

Distribution. Kenya, Tanzania, Uganda, South Africa (Swinscow & Krog 1988).

Leptogium cochleatum (Dickson) P.M. Jørg. & P. James.

Distribution. Pantropical (Alstrup & Christensen 2006). Widespread in tropical and temperate areas of South America, western Europe, South and East Africa, India and eastern Australia (Aragon et al. 2005).

Leptogium coralloideum (Meyen & Flot.) Vain.

Distribution. Pantropical (Alstrup & Christensen 2006). East Africa. Mostly spread in tropical and temperate regions (Swinscow & Krog 1988). South America, Europe, the Philippines, Papua New Guinea, Australia and New Zealand (Verdon 1990, 1992).

Leptogium cyanescens (Ach.) Körb.

Distribution. Kenya, Tanzania, Uganda. Wide spread in tropical and temperate regions (Swinscow & Krog 1988; Alstrup & Christensen 2006).

Leptogium gelatinosum (With.) Laundon.

Distribution. Tanzania (Alstrup & Christensen 2006), East Africa (Swinscow & Krog 1988), Kenya (Frisch & Hertel 1988), North America, Europe and Asia (Sierk 1964).

Leptogium hibernicum P.M. Jørg.

Distribution. Pantropical (Alstrup & Christensen 2006). East Africa, Europe, South America (Swinscow & Krog 1988), West Indies, Macaronesia, Europe, East Africa to South Africa, and New Guinea (Jørgensen 1997).

Leptogium javanicum Mont.

Distribution. Pantropical (Alstrup & Christensen 2006). Central and South America, East Africa (Kenya and Tanzania), India, the Philippines, Indonesia, Papua New Guinea, Australia and Pacific Islands (Swinscow & Krog 1988; Verdon 1992).

Leptogium laceroides B. de Lesd.

Distribution. Kenya, Tanzania, Europe, the Americas, New Zealand (Swinscow & Krog 1988).

Leptogium marginellum (Sw.) Gray

Distribution. Kenya, Tanzania, Uganda, tropical America, West Indies, Philippines, Australia (Swinscow & Krog 1988; Alstrup & Christensen 2006).

Leptogium phyllocarpum (Pers.) Mont.

Distribution. East Africa. Mostly spread in tropical and subtropical regions (Swinscow & Krog 1988; Alstrup & Christensen 2006).

Leptogium rivulare (Ach.) Mont.

Distribution. Tanzania (Alstrup & Christensen 2006), NW Russia, Sweden, Estonia, France, NE USA and Canada (Jørgensen & James 1983; Jørgensen 1994).

Leptogium sessile Vainio.

Distribution. East Africa West Indies, Florida (Swinscow & Krog 1988; Alstrup & Christensen 2006).

Leptogium vesiculosum (Sw.) Malme

Distribution. Kenya, Tanzania, tropical America, West Indies (Swinscow & Krog 1988).

Lobaria asperula (Stirt.) Yoshim.

Distribution. Tanzania, New Zealand (Swinscow & Krog 1988).

Chemistry. Gyrophoric acid (Swinscow & Krog 1988).

Lobaria discolor (Bory) Hue.

Distribution. Kenya, Tanzania, Madagascar, Reunion, Indonesia and Australia (Alstrup & Christensen 2006).

Lobaria holstiana (Müll. Arg.) Zahlbr.

Distribution. Tanzania (Swinscow & Krog 1988).

Chemistry. Gyrophoric acid (Swinscow & Krog 1988).

Lobaria patinifera (Taylor) Hue

Distribution. Tanzania, Kenya, Uganda; wide spread in tropical (Swinscow & Krog 1988; Alstrup & Christensen 2006).

Chemistry. Gyrophoric acid (Swinscow & Krog 1988).

Lobaria pulmonaria (L.) Hoffm.

Distribution. East Africa; widespread in the temperate and boreal areas of the Northern hemisphere and cooler parts of the tropics, Australia (Swinscow & Krog 1988; Alstrup & Christensen 2006).

Chemistry. Gyrophoric acid (Swinscow & Krog 1988).

Lobaria retigera (Bory) Trevis.

Distribution. East and South Africa, Australia, New Zealand, Asia, North America (Swinscow & Krog 1988; Alstrup & Christensen 2006).

Chemistry. Stictic acid; thelephoric acid; triterpenoids acid (Swinscow & Krog 1988).

Mazosia dispersa (Hedrick) R. Sant.

Distribution. Known from tropical America and Africa; in Tanzania (Farkas 1987).

Mazosia melanophthalma (Müll. Arg.) R. Sant.

Distribution. Widespread in tropical areas with dry and semi ever green forest, sub montane forests and rocky forests (Farkas 1987, 2015).

Mazosia phyllosema (Nyl.) Zahlbr.

Distribution. Widespread in tropical areas with dry and semi ever- green forest, sub montane forests and rocky forests (Farkas 1987, 2015).

Mazosia rotula (Mont.) Massal.

Distribution. Africa; Republic Guinea, West Africa Tanzania and tropical America (Farkas 1987).

Menegazzia aff. *terebrata* (Hoffm.) A. Massal.

Distribution. Tanzania (Krog 2000), worldwide distribution.

Chemistry. Atranorin; constictic acid; cryptostictic acid; menegazziaic acid; norstictic acid; stictic acid (Alstrup et al. 2010).

Montanelia panniformis (Nyl.) Divakar, A. Crespo, Wedin & Essl.

Distribution. East Africa, circumpolar in the northern hemisphere, North America, north and central Europe, South America, southeast Asia.

Chemistry. Perlatolic acid (Alstrup et al. 2010).

Mycocalicium victoriae (F. Wilson) Tibell

Distribution. Tanzania and Madagascar (Tibell 2001). Known from Australia, New Zealand, North America and Europe.

Mycomicrothelia confusa D. Hawksw.

Distribution. Tanzania; Luhega Forest, Mountain Udzungwa forest. Found in Macaronesia only from the Azores (Berger & Aptroot 2002; Alstrup & Aptroot 2005).

Myelochroa aurulenta (Tuck.) Elix & Hale

Distribution. Widely distributed in tropical and warm temperature regions.

Chemistry. Atranorin; secalonic acid A; triterpenoids (Swinscow & Krog 1988).

Nephroma isidiosum (Nyl.) Gyeln.

Distribution. Kenya, Tanzania, Russia, Siberia, Alaska (Swinscow & Krog 1988).

Chemistry. Gyrophoric acid; methylgyrophorate (Swinscow & Krog 1988).

Nephroma tropicum (Müll. Arg.) Zahlbr.

Distribution. East Africa with wide distribution in tropics (Swinscow & Krog 1988; Alstrup & Christensen 2006).

Chemistry. Gyrophoric acid; methylgyrophorate; triterpenoids (Swinscow & Krog 1988).

Normandina pulchella (Borrer) Nyl.

Distribution. A widespread species in the tropical and temperate zones (Swinscow & Krog 1988).

Opegraphafilicina Mont.

Distribution. Pantropical, subtropical America, Tanzania (Farkas 1987).

Opegrapha lambinonii Ser.

Distribution. Tanzania.

Pannaria conoplea (Ach.) Bory.

Distribution. Cosmopolitan (Alstrup & Christensen 2006). Widespread species in temperate zones of the northern and southern hemisphere including South America, East Africa and Southeast Australia (Jørgensen & Galloway 1992). Tanzania, West Indies, Philippines and Australia (Alstrup & Christensen 2006).

Pannaria fulvescens (Mont.) Nyl.

Distribution. Kenya, Tanzania, Uganda and Australasia (Swinscow & Krog 1988).

Chemistry. Pannarin (Swinscow & Krog 1988).

Pannaria rubiginosa (Ach.) Bory

Distribution. East Africa with worldwide distribution (Swinscow & Krog 1988).

Pannaria santessonii Swinscow & Krog

Distribution. Tanzania (Swinscow & Krog 1988).

Chemistry. Pannarin (Swinscow & Krog 1988).

Pannaria stylophora Vainio

Distribution. Tanzania, West Indies, Philippines and Australia (Alstrup & Christensen 2006).

Parmeliella nigrocincta (Mont.) Müll. Arg.

Distribution. Kenya, Tanzania. Distributed in tropics and subtropics (Swinscow & Krog 1988).

Chemistry. Triterpenoids (Swinscow & Krog 1988; Alstrup & Christensen 2006).

Parmelinella amazonica (Nyl.) A.S. Rodrigues, A.P. Lorenz & Canêz

Distribution. Tanzania, South Africa (Swinscow & Krog 1988).

Chemistry. Protocetraric acid; usnic acid (Swinscow & Krog 1988).

Parmeliella pannosa (Sw.) Müll. Arg.

Distribution. Kenya, Tanzania, Uganda. Distributed in tropics and subtropics (Swinscow & Krog 1988; Alstrup & Christensen 2006).

Parmelinella simplicior (Hale) Elix & Hale

Distribution. The species is distributed in India, Ethiopia, Uganda and Tanzania.

Parmeliella triptophylla (Ach.) Müll. Arg.

Distribution. Kenya, Tanzania, subtropical to arctic, widespread on the Northern Hemisphere. Macaronesia (Alstrup & Christensen 2006).

Parmeliella triptophylloides P.M. Jørg.

Distribution. Kenya, Tanzania (Alstrup & Christensen 2006).

Parmelinella wallichiana (Taylor) Elix & Hale

Distribution. The species is widespread in East Africa and Asia (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Atranorin; consalazinic acid; salazinic acid; secalononic acid A (Alstrup et al. 2010). The species is synonymy with *Pseudoparmelia wallichiana* (Taylor) Krog & Swinscow.

Parmotrema abessinicum (Nyl. ex Kremp.)

Distribution. East Africa (Swinscow & Krog 1988).

Chemistry. Atranorin; caperatic; protolichesterinic acids (Swinscow & Krog 1988).

Parmotrema aldabrense (C.W. Dodge) Hale

Distribution. Kenya, Tanzania, Aldabra Island, Madagascar (Swinscow & Krog 1988).

Chemistry. Atranorin; norstictic; stictic acids (Swinscow & Krog 1988).

Parmotrema amaniense (J. Steiner & Zahlbr.) Krog & Swinscow

Distribution. The species is endemic to Africa (Swinscow & Krog 1988).

Chemistry. Atranorin; protocetraric; protolichesterinic acids (Swinscow & Krog 1988; Alstrup et al. 2010).

Parmotrema andinum (Müll. Arg.) Hale

Distribution. Central and East Africa, Asia and South America (Swinscow & Krog 1988).

Chemistry. Atranorin; lecanoric acid (Swinscow & Krog 1988; Alstrup et al. 2010).

Parmotrema araucariarum (Zahlbr.) Hale

Distribution. Tanzania (Alstrup et al. 2010), Kenya and South America (Swinscow & Krog 1988).

Chemistry. Atranorin; protolichesterinic acid (Swinscow & Krog 1988; Alstrup et al. 2010).

Parmotrema austrosinense (Zahlbr.) Hale

Distribution. The species is widespread in tropical and temperate regions (Swinscow & Krog 1988).

Chemistry. Atranorin; lecanoric acid (Swinscow & Krog 1988; Alstrup et al. 2010).

Parmotrema bangii (Vain.) Hale

Distribution. The species is widespread in tropical and temperate regions (Swinscow & Krog 1988).

Chemistry. Atranorin; constictic acid; stictic acid (Swinscow & Krog 1988).

Parmotrema cetratum (Ach.) Hale

Distribution. This species is widespread in temperate regions and montane in East Africa (Swinscow & Krog 1988).

Chemistry. Atranorin; salazinic acid (Swinscow & Krog 1988).

Parmotrema cooperi (J. Steiner & Zahbr.) Sérus.

Distribution. East, South and Central Africa, Madagascar, Asia, Australia (Swinscow & Krog 1988).

Chemistry. Atranorin; lecanoric acid (Swinscow & Krog 1988).

Parmotrema crinitum (Ach.) M. Choisy

Distribution. Widespread in temperate and tropical regions (Swinscow & Krog 1988).

Chemistry. Atranorin; constictic acid; stictic acid (Swinscow & Krog 1988; Alstrup et al. 2010).

Parmotrema cristiferum (Taylor) Hale

Distribution. Widespread in tropical and subtropical regions (Swinscow & Krog 1988).

Chemistry. Atranorin; salazinic acid (Swinscow & Krog 1988).

Parmotrema cryptoxanthum (Abbayes) Hale

Distribution. Kenya, Tanzania, South Africa and Madagascar (Swinscow & Krog 1988).

Chemistry. Atranorin; echinocarpic acid; photolichesterinic acid (Swinscow & Krog 1988).

Parmotrema degelianum Krog & Swinscow

Distribution. Tanzania (Swinscow & Krog 1988).

Parmotrema dilatatum (Vain.) Hale

Distribution. Pantropical, known from Africa, Asia and South America (Swinscow & Krog 1988).

Chemistry. Atranorin; protocetraric acid (Swinscow & Krog 1988; Alstrup et al. 2010).

Parmotrema direagens (Hale) Hale

Distribution. Kenya, Tanzania, South Africa and Asia (Swinscow & Krog 1988).

Chemistry. Aletronic acid; atranorin; gyrophoric acid; psoromic acid (Swinscow & Krog 1988).

Parmotrema durumae (Krog & Swinscow) Krog & Swinscow

Distribution. Eastern Africa (Swinscow & Krog 1988).

Chemistry. Atranorin; aletronic acid; α -collatolic acid (Swinscow & Krog 1988).

Parmotrema eciliatum (Nyl.) Hale

Distribution. Tanzania, South Africa, Asia, Central and South America, West Indies and Australia (Swinscow & Krog 1988).

Chemistry. Atranorin; constictic acid; stictic acid (Swinscow & Krog 1988).

Parmotrema eunetum (Stirton) Hale

Distribution. East and West Africa, Asia and West Indies (Swinscow & Krog 1988).

Chemistry. Atranorin; gyrophoric acid; norstictic acid (Swinscow & Krog 1988).

Parmotrema eurysacum (Hue) Hale

Distribution. Tanzania, North and Central America (Swinscow & Krog 1988).

Chemistry. Atranorin; salazinic acid (Swinscow & Krog 1988).

Parmotrema gardneri (C.W. Dodge) Sérus.

Distribution. East Africa and southeastern North America (Swinscow & Krog 1988).

Chemistry. Atranorin; protocetraric acid (Swinscow & Krog 1988).

Parmotrema hababianum (Gyeln.) Hale

Distribution. East Africa, Asia and the Americas (Swinscow & Krog 1988).

Chemistry. Atranorin; protolichesterinic acid (Swinscow & Krog 1988; Alstrup et al. 2010).

Parmotrema hanningtonianum (Müll. Arg.) Hale

Distribution. Tanzania, Central and West Africa and South America (Swinscow & Krog 1988).

Chemistry. Atranorin; gyrophoric acid (Swinscow & Krog 1988).

Parmotrema hicksii Krog & Swinscow

Distribution. Tanzania (Swinscow & Krog 1988).

Chemistry. Atranorin; gyrophoric acid; psoromic acid (Swinscow & Krog 1988).

Parmotrema hololobum (Hale) Hale

Distribution. Kenya, Tanzania, Uganda (Swinscow & Krog 1988).

Chemistry. Atranorin; lecanoric acid (Swinscow & Krog 1988).

Parmotrema indicum Hale

Distribution. Kenya, Tanzania, Uganda, Asia (Swinscow & Krog 1988).

Chemistry. Atranorin; gyrophoric acid; norlobaridone (Swinscow & Krog 1988; Alstrup et al. 2010).

Parmotrema leonis (Swinscow & Krog) Swinscow & Krog

Distribution. The species is endemic to Africa and known from Kenya (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Atranorin; protolichesterinic acid (Swinscow & Krog 1988).

Parmotrema lobulascens (J. Steiner) Hale

Distribution. East, West and South Africa and Asia (Swinscow & Krog 1988).

Chemistry. Atranorin; alectoronic acid; gyrophoric acid; α -collatolic (Swinscow & Krog 1988).

Parmotrema lophogenum (Abbeyes) Hale

Distribution. Kenya, Tanzania, West Africa and Madagascar (Swinscow & Krog 1988).

Chemistry. Atranorin; gyrophoric acid (Swinscow & Krog 1988).

Parmotrema maclayanum (Müll. Arg.) Hale

Distribution. East, West and South Africa, Madagascar, Asia and South America (Swinscow & Krog 1988).

Chemistry. Alectoronic acid; atranorin (Swinscow & Krog 1988).

Parmotrema mellissii (C.W. Dodge) Hale

Distribution. Kenya, Tanzania; distributed in tropical regions (Swinscow & Krog 1988).

Chemistry. Alectoronic acid; atranorin; α -collatolic acid (Swinscow & Krog 1988).

Parmotrema nilgherrense (Nyl.) Hale

Distribution. The species is known from East Africa and Asia (Swinscow & Krog 1988).

Chemistry. Alectoronic acid; atranorin; α -collatolic acids (Swinscow & Krog 1988; Alstrup et al. 2010).

Parmotrema perlatum (Osbeck) M. Choisy

Distribution. Pantemperate.

Parmotrema permutatum (Stirt.) Hale

Distribution. East Africa, Asia, Australia, South America, West India (Swinscow & Krog 1988).

Chemistry. Atranorin; gyrophoric acid (Swinscow & Krog 1988; Alstrup et al. 2010).

Parmotrema pigmentiferum (Krog & Swinscow) Krog & Swinscow

Distribution. Kenya, Tanzania (Swinscow & Krog 1988).

Chemistry. Atranorin acid (Swinscow & Krog 1988).

Parmotrema planatlobatum (Hale) Hale

Distribution. Tanzania, Asia (Swinscow & Krog 1988).

Chemistry. Atranorin; gyrophoric acid (Swinscow & Krog 1988).

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

Distribution. Kenya, Tanzania, Madagascar, Asia, Australia (Swinscow & Krog 1988).

Chemistry. Alectoronic acid; atranorin; α -collatolic acids (Swinscow & Krog 1988).

Parmotrema pseudocrinitum (Abbeyes) Hale

Distribution. Kenya, Tanzania, Uganda, Asia (Swinscow & Krog 1988).

Chemistry. Atranorin; gyrophoric acid (Swinscow & Krog 1988).

Parmotrema praesorediosum (Nyl.) Hale

Distribution. Widespread in tropical and warm temperate regions.

Chemistry. Atranorin (Swinscow & Krog 1988).

Parmotrema pseudeunetum Sérus.

Distribution. The species is endemic to Africa.

Chemistry. Atranorin; gyrophoric acid (Swinscow & Krog 1988).

Parmotrema pseudograyanum (Abbeyes) Hale

Distribution. Africa (Swinscow & Krog 1988).

Chemistry. Atranorin; fumarprotocetraric acid; protocetraric acid (Swinscow & Krog 1988).

Parmotrema pseudonilgherrense (Asahina) Hale

Distribution. Kenya and Tanzania. It is also distributed in Australia and Asia.

Chemistry. Alectoronic acid; atranorin; α -collatolic acids (Alstrup et al. 2010).

Parmotrema ravum (Krog & Swinscow) Sérus

Distribution. Africa (Swinscow & Krog 1988).

Chemistry. Atranorin; protocetraric acid; usnic acid (Swinscow & Krog 1988).

Parmotrema reticulatum (Taylor) M. Choisy

Distribution. Widely distributed in tropical and temperate regions.

Chemistry. Atranorin; caperatic acid; salazinic acid (Swinscow & Krog 1988; Alstrup et al. 2010).

Parmotrema rimulosum (C.W. Dodge) Hale

Distribution. Kenya, Tanzania, South Africa (Swinscow & Krog 1988).

Chemistry. Alectoronic acid; atranorin; α -collatolic acids; skyrin (Swinscow & Krog 1988).

Parmotrema sancti-angelii (Lyngé) Hale

Distribution. A widespread tropical species.

Parmotrema soyauxii (Müll. Arg.) Hale

Distribution. Kenya, Tanzania, Uganda, West and South Africa and Madagascar (Swinscow & Krog 1988).

Chemistry. Atranorin; lecanoric acid (Swinscow & Krog 1988).

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

Distribution. Kenya, Tanzania, Uganda (Swinscow & Krog 1988).

Chemistry. Atranorin; lecanoric acid (Swinscow & Krog 1988).

Parmotrema subarnoldii (Abbayes) Hale

Distribution. East Africa, Madagascar, tropical Asia and America.

Chemistry. Atranorin; protocetraric acid; protoliches-terinic acid; skyrin (Swinscow & Krog 1988).

Parmotrema subsidiosum (Müll. Arg.) Hale

Distribution. Widespread in tropical and warm temperate regions.

Chemistry. Atranorin; salazinic acid (Swinscow & Krog 1988).

Parmotrema subschimperii (Hale) Hale

Distribution. The species is known from East Africa only.

Chemistry. Atranorin; gyrophoric acid; norstictic acid (Swinscow & Krog 1988).

Parmotrema subsumptum (Nyl.) Hale

Distribution. Widespread in tropical and warm temperate regions.

Chemistry. Atranorin; salazinic acid (Swinscow & Krog 1988; Alstrup et al. 2010).

Parmotrema subtinctorium (Zahlbr.) Hale

Distribution. Widespread in tropical and warm temperate regions.

Chemistry. Atranorin; salazinic (Swinscow & Krog 1988; Alstrup et al. 2010).

Parmotrema tinctorum (Despr. ex Nyl.) Hale

Distribution. Widespread in tropical and temperate regions.

Chemistry. Atranorin; lecanoric acid (Swinscow & Krog 1988; Alstrup et al. 2010).

Parmotrema uberrimum (Hue) Hale

Distribution. Kenya, Tanzania, Uganda (Swinscow & Krog 1988).

Chemistry. Atranorin; alectoronic acid (Swinscow & Krog 1988).

Parmotrema ultralucens (Krog) Hale

Distribution. Kenya, Tanzania, South Africa and Madagascar, southeastern USA (Swinscow & Krog 1988; Harris 1995).

Chemistry. Atranorin; salazinic acid (Swinscow & Krog 1988).

Parmotrema vividum (Krog & Swinsow) Krog & Swinscow

Distribution. Tanzania (Swinscow & Krog 1988).

Chemistry. Protocetraric acid; usnic acid (Swinscow & Krog 1988).

Parmotrema zollingeri (Hepp) Hale

Distribution. Kenya, Tanzania. Distributed in tropics (Swinscow & Krog 1988).

Chemistry. Atranorin; protocetraric acid (Swinscow & Krog 1988).

Peltigera alkalicola Kaasalainen

Distribution. Alaska (USA), Ningxia (China), Tanzania (Kaasalainen et al. 2022).

Peltigera cichoracea Jatta

Distribution. Kenya, Tanzania (Swinscow & Krog 1988).

Chemistry. Gyrophoric acid; methylgyrophorate; triterpenoids (Swinscow & Krog 1988).

Peltigera didactyla (With) J.R. Laundon

Distribution. Cosmopolitan species. Kenya, Tanzania (Swinscow & Krog 1988).

Peltigera dolichorrhiza (Nyl.) Nyl

Distribution. Kenya, Tanzania, Uganda (Swinscow & Krog 1988; Alstrup & Christensen 2006; Kaasalainen et al. 2022).

Chemistry. Dolichorrhizin; gyrophoric acid; methylgyrophorate; peltidactylin; tenuiorin; triterpenoids; zeorin (Swinscow & Krog 1988; Kaasalainen et al. 2022).

Peltigera polydactylon (Neck.) Hoffm.

Distribution. Kenya, Tanzania. Distributed in the northern hemisphere (Swinscow & Krog 1988).

Chemistry. Gyrophoric acid; methylgyrophorate; triterpenoids (Swinscow & Krog 1988).

Peltigera polydactyloides Nyl.

Distribution. Eastern and western Africa (Swinscow & Krog 1988; Kaasalainen et al. 2022).

Chemistry. Gyrophoric acid; methylgyrophorate; tenuiorin; triterpenoids; zeorin (Swinscow & Krog 1988; Kaasalainen et al. 2022).

Peltigera praetextata (Flörke ex Sommerf.) Zopf

Distribution. Kenya, Tanzania, Uganda. Widespread in the northern hemisphere (Swinscow & Krog 1988; Kaasalainen et al. 2022).

Peltigera rufescentiformis (Gyeln.) C.W. Dodge

Distribution. Kenya, Tanzania, Uganda (Swinscow & Krog 1988; Kaasalainen et al. 2022).

Peltigera seneca Magain, Miadl. & Sérus.

Distribution. Tropical (Kaasalainen et al. 2022).

Chemistry. Dolichorrhizin; methylgyrophorate; peltidactylin; tenuiorin; zeorin (Kaasalainen et al. 2022).

Peltigera sorediifera (Nyl.) Vitik.

Distribution. East Africa (Kaasalainen et al. 2022).

Chemistry. Gyrophoric acid; methylgyrophorate (Kaasalainen et al. 2022).

Peltigera ulcerata Müll. Arg.

Distribution. East Africa. Distributed in tropical regions and in the temperate zone of the southern hemisphere (Swinscow & Krog 1988; Alstrup & Christensen 2006; Kaasalainen et al. 2022).

Peltula patellata (Bagl.) Swinscow & Krog.

Distribution. Tanzania, widespread in the tropics and warm temperate regions (Alstrup & Christensen 2006).

Peltula umbilicata (Vainio) Swinscow & Krog.

Distribution. Kenya, Tanzania, Uganda, Ivory Coast and South Africa (Alstrup & Christensen 2006).

Phaeophyscia adiastrata (Essl.) Essl.

Distribution. East Africa and North America (Swinscow & Krog 1988).

Phaeophyscia confusa Moberg

Distribution. East Africa (Swinscow & Krog 1988).

Phaeophyscia endococcina (Körb.) Moberg

Distribution. East Africa. Widespread in temperate and boreal areas.

Phaeophyscia endococcinodes (Poelt) Essl.

Distribution. East Africa and North America, New Zealand (Swinscow & Krog 1988).

Chemistry. Skyrin; triterpenoids (Swinscow & Krog 1988).

Phaeophyscia fumosa Moberg

Distribution. Kenya, Tanzania (Swinscow & Krog 1988).

Chemistry. Skyrin (Swinscow & Krog 1988).

Phaeophyscia hispidula (Ach.) Moberg

Distribution. The species is widespread in tropical and subtropical regions (Swinscow & Krog 1988).

Phylloblastia borhidii (Farkas & Vězda) Lücking

Distribution. Widespread in tropical areas with rocky forests (Farkas 2015).

Phyllopsora breviscula Müll. Arg.

Distribution. Tanzania and Cuba (Swinscow & Krog 1988).

Phyllopsora buettneri (Müll. Arg.) Zahlbr.

Distribution. Tanzania, Uganda and West Africa (Swinscow & Krog 1988) and southeastern USA.

Chemistry. Pannarin; zeorin (Swinscow & Krog 1988).

Phyllopsora castaneocincta (Hue) Kistenich & Timdal

Distribution. East Africa and Asia (Alstrup et al. 2010).

Phyllopsora confusa Swinscow & Krog

Distribution. East Africa, North and South America, and Papua New Guinea (Swinscow & Krog 1988; Alstrup et al. 2010).

Phyllopsora corallina (Eschw.) Müll. Arg.

Distribution. Widespread in tropical areas (Alstrup et al. 2010).

Phyllopsora furfuracea (Pers.) Zahlbr.

Distribution. East Africa, South America and Japan (Swinscow & Krog 1988; Alstrup et al. 2010).

Phyllopsora halei (Tuck.) Zahlbr.

Distribution. The species is known from North America (Alstrup et al. 2010). Also, known from East Africa, Papua New Guinea, Taiwan and Brazil (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Atranorin; triterpenoids (Swinscow & Krog 1988).

Phyllopsora mediocris Swinscow & Krog

Distribution. This species is only known in Tanzania (Swinscow & Krog 1988; Alstrup et al. 2010).

Phyllopsora porphyromelaena (Vainio) Zahlbr.

Distribution. South Africa, Australia and Asia (Swinscow & Krog 1988).

Physcia adscendens (Fr.) H. Olivier

Distribution. The species is known from East Africa. It is cosmopolitan.

Chemistry. Atranorin (Swinscow & Krog 1988).

Physcia aipolia (Ehrh. ex Humb.) Fűrnr.

Distribution. The species is known from East Africa. It is cosmopolitan.

Chemistry. Atranorin; zeorin (Swinscow & Krog 1988).

Physcia albata (F. Wilson) Hale

Distribution. The species is known from East Africa, Australia and New Zealand.

Chemistry. Atranorin; zeorin (Swinscow & Krog 1988; Alstrup et al. 2010).

Physcia alboplumbea (Taylor) Nyl.

Distribution. The species is known from East Africa and Australia (Swinscow & Krog 1988).

Chemistry. Atranorin; zeorin (Swinscow & Krog 1988).

Physcia atrostriata Moberg

Distribution. The species is known from East Africa and Sudan (Swinscow & Krog 1988) and eastern North America.

Chemistry. Atranorin; zeorin (Swinscow & Krog 1988).

Physcia biziana (A. Massal.) Zahlbr.

Distribution. Known from Ethiopia, Kenya, South Africa, Europe, western USA and Mexico.

Chemistry. Atranorin; zeorin (Swinscow & Krog 1988; Alstrup et al. 2010).

Physcia caesia (Hoffm.) Fűrnr.

Distribution. The species is cosmopolitan. Known from Kenya and Tanzania (Swinscow & Krog 1988).

Chemistry. Atranorin; zeorin (Swinscow & Krog 1988).

Physcia cfr. *crispa* Nyl.

Distribution. East Africa, Pacific Islands and southern Florida.

Chemistry. Atranorin (Swinscow & Krog 1988; Alstrup et al. 2010).

Physcia dilatata Nyl.

Distribution. Known from East Africa and Central America.

Chemistry. Atranorin; zeorin (Swinscow & Krog 1988; Alstrup et al. 2010).

Physcia dimidiata (Arnold) Nyl.

Distribution. Known from Ethiopia, Kenya and Europe (Alstrup et al. 2010) and southwestern North America.

Physcia erumpens Moberg

Distribution. The species is known from East Africa (Swinscow & Krog 1988) and North America.

Chemistry. Atranorin; zeorin (Swinscow & Krog 1988).

Physcia fragilescens Zahlbr.

Distribution. The species is known from East Africa (Swinscow & Krog 1988).

Chemistry. Atranorin; zeorin (Swinscow & Krog 1988).

Physcia integrata Nyl.

Distribution. East Africa and Mexico.

Chemistry. Atranorin; zeorin (Swinscow & Krog 1988; Alstrup et al. 2010).

Physcia krogiae Moberg

Distribution. Widespread in tropical and subtropical regions.

Chemistry. Atranorin; zeorin (Swinscow & Krog 1988; Alstrup et al. 2010).

Physcia poncinsii Hue

Distribution. A widely distributed species.

Chemistry. Atranorin; zeorin (Swinscow & Krog 1988; Alstrup et al. 2010).

Physcia tribacia (Ach.) Nyl.

Distribution. A widely distributed species in temperate regions (Swinscow & Krog 1988).

Chemistry. Atranorin; zeorin (Swinscow & Krog 1988).

Physcia verrucosa Moberg

Distribution. The species is known from East Africa and Somalia (Swinscow & Krog 1988).

Chemistry. Atranorin; zeorin (Swinscow & Krog 1988).

Physcidia squamulosa Tuck.

Distribution. East Africa, known from North and Central America (Alstrup et al. 2010).

Physcidia wrightii Tuck.

Distribution. Tanzania, tropical America and Asia (Swinscow & Krog 1988).

Chemistry. Atranorin; homosekikaic acid; sekikaic acid (Swinscow & Krog 1988).

Physconia muscigena (Ach.) Poelt

Distribution. Kenya, Tanzania and northern hemisphere (Swinscow & Krog 1988).

Physma byrsaeum (Ach.) Tuck.

Distribution. Kenya, Tanzania and in the tropics (Swinscow & Krog 1988).

Placopsis craterifera Boluda

Distribution. Tanzania (Boluda & Kitara 2024).

Chemistry. Gyrophoric acid (Boluda & Kitara 2024).

Platismatia glauca (L.) W.L. Culb. & C.F. Culb.

Distribution. The species is known from East Africa and tropics at higher altitude to subarctic regions (Swinscow & Krog 1988).

Chemistry. Atranorin; caperatic acid (Swinscow & Krog 1988).

Polychidium dendriscum (Nyl.) Henssen.

Distribution. Tanzania, West Europe, Macaronesia, Brazil, Hawaii and New Caledonia (Alstrup & Christensen 2006).

Polymeridium albocinereum (Kremp.) R.C. Harris

Distribution. A pantropical species (Alstrup & Aptroot 2005).

Polymeridium contendens (Nyl.) R.C. Harris

Distribution. A pantropical species, distributed in America and Asia (Aptroot et al. 1997; Alstrup & Aptroot 2005).

Porina atlantica (Erichs.) P.M. Jørg. (= *P. guaranitica* Malme)

Distribution. A predominantly neotropical species, in Africa so far known only from the Canary Isles (McCarthy 2004; Alstrup & Aptroot 2005).

Porina epiphylla (Fée) Fée

Distribution. Widespread in tropical areas with rocky forests (Farkas 2015).

Porina epiphyloides Vězda

Distribution. Widespread in tropical areas with rocky forests (Farkas 1987, 2015).

Porina leptosperma Müll. Arg.

Distribution. Widespread in tropical areas with lowland forests, submontane forests and rocky forests (Farkas 2015).

Porina limbulata (Kremp.) Vain

Distribution. Pantropical species (Farkas 1987).

Porina mastoidea (Ach.) Müll. Arg.

Distribution. A pantropical species. Tanzania; Massisiwe Forest, Itonya Forest, Luhega Forest, Idete, Mountain Udzungwa forests (McCarthy 2004; Alstrup & Aptroot 2005).

Porina mastoidiza (Nyl.) Müll. Arg.

Distribution. Mostly neotropical species (Alstrup & Aptroot 2005).

Porina nitidula Müll. Arg.

Distribution. Widespread in tropical areas with rocky forests (Farkas 1987, 2015).

Porina nucula Ach.

Distribution. A pantropical species. Tanzania; Ilutile, Pugu Hills, Luhega Forest, Coastal + mountain Udzungwa and Pugu forests, in Africa; from Guinea, Sao Thomé and the Canary Isles (McCarthy 2004; Alstrup & Aptroot 2005).

Porina rubentior (Stirton) Müll. Arg.

Distribution. Pantropical (Farkas 1987).

Porina semecarpi Vainio

Distribution. Macaronesia, Africa (Cameroun, Republic Guinea, Tanzania), Malasia and Australia, Asia (Farkas 1987).

Porina sphaerocephaloides Farkas

Distribution. Widespread in tropical areas with submontane forests (Farkas 2015).

Porina subinterstes (Nyl.) Müll. Arg.

Distribution. A pantropical species. Tanzania; Luhega Forest, Mountain Udzungwa forests. Widespread in Asia and South America (McCarthy 2004; Alstrup & Aptroot 2005).

Porina tetracerae (Ach.) Müll. Arg.

Distribution. A pantropical species. Tanzania Kivulamo, Luhega Forest, Sanje Waterfall, Pugu, Changwahela, Massisiwe Forest, Luhangalo Plateau, Ilutila Morogoro, Matema Beach. Widespread in coastal and mountain forests. Already known from Tanzania (McCarthy 2004; Alstrup & Aptroot 2005).

Porina tetralocularis Aptroot

Distribution. A rarely reported neotropical species, not known so far from Africa (McCarthy 2004). Tanzania; Mountain Udzungwa forest (Alstrup & Aptroot 2005).

Porina tetramera (Malme) R. Sant.

Distribution. Widely distributed in the tropics (Farkas 1987).

Pseudocyphellaria argyracea (Delise) Vain.

Distribution. The species is known from East Africa and in the tropics (Swinscow & Krog 1988; Alstrup & Christensen 2006).

Chemistry. Triterpenoids (Swinscow & Krog 1988).

Pseudocyphellaria clathrata (de Not.) Malme

Distribution. The species is known from East Africa and South America (Swinscow & Krog 1988; Alstrup & Christensen 2006).

Chemistry. Triterpenoids (Swinscow & Krog 1988).

Pseudoparmelia ecaperata (Müll. Arg.) Hale

Distribution. Eastern, Western and southern Africa, Nepal, India, Thailand (Swinscow & Krog 1988).

Chemistry. Atranorin; divaricatic acid; usnic acid (Swinscow & Krog 1988).

Pseudoparmelia epileuca (Hale) Hale

Distribution. Kenya, Tanzania, Mozambique (Swinscow & Krog 1988).

Chemistry. Atranorin; protocetraric acid (Swinscow & Krog 1988).

Pseudocyphellaria intricata (Del.) Vain.

Distribution. Widespread in the tropics and the temperate regions, in E Africa known from Kenya and Tanzania (Alstrup & Christensen 2006).

Pseudoparmelia intertexta (Mont. & Bosch) Hale

Distribution. Tanzania, Asia, Australia, New Guinea (Swinscow & Krog 1988).

Chemistry. Protocetraric acid; usnic acid (Swinscow & Krog 1988).

Pseudoparmelia nairobiensis (J. Steiner & Zahlbr.) Hale

Distribution. East and West Africa (Swinscow & Krog 1988).

Chemistry. Atranorin; divaricatic acid (Swinscow & Krog 1988).

Pseudoparmelia somaliensis (Müll. Arg.) Hale

Distribution. East Africa, Somalia, Zambia, Madagascar (Swinscow & Krog 1988).

Chemistry. Atranorin; protocetraric acid (Swinscow & Krog 1988).

Pseudoparmelia sphaerospora (Nyl.) Hale

Distribution. Kenya, Tanzania, Central Africa, Madagascar, the Americas (Swinscow & Krog 1988).

Pseudoparmelia texana (Tuck.) Hale

Distribution. It is widely distributed in tropical and subtropical regions (Swinscow & Krog 1988; Alstrup et al. 2010).

Pseudoparmelia usambarensis (J. Steiner & Zahlbr.) Krog & Swinscow

Distribution. Eastern and western Africa (Swinscow & Krog 1988).

Chemistry. Atranorin; salazinic acid (Swinscow & Krog 1988).

Pseudopyrenula diluta (Fée) Müll. Arg.

Distribution. A pantropical species. Tanzania; Mountain Udzungwa forest, in Africa; Cameroon, Guinea and Ivory Coast (Harris 1998; Alstrup & Aptroot 2005).

Pseudopyrenula subnudata Müll. Arg. (= *P. diluta* var. *degenerans* Vain.)

Distribution. A pantropical species. Tanzania; Pugu Hill, Luhangalo Plateau. Mountain Uluguru and Pugu forests, in Africa; Cameroon, Sierra Leone and Zaire (Harris 1998).

Psoroglaena cubensis Müll. Arg.

Distribution. A pantropical species. Tanzania; Luhangalo Plateau. Mountain Uluguru forest, in Africa; Kenya and Seychelles (Eriksson 1992; Alstrup & Aptroot 2005).

Punctelia borrieri (Sm.) Krog

Distribution. Widespread in tropical and temperate regions.

Chemistry. Atranorin; gyrophoric acid (Swinscow & Krog 1988).

Punctelia neutralis (Hale) Krog

Distribution. East and South Africa and Asia (Swinscow & Krog 1988).

Chemistry. Atranorin; caperatic acid (Swinscow & Krog 1988).

Punctelia rudecta (Ach.) Krog

Distribution. Widespread in tropical and temperate regions of northern and southern hemisphere (Swinscow & Krog 1988).

Chemistry. Atranorin; lecanoric acid (Swinscow & Krog 1988).

Punctelia semansiana (W.L. Culb. & C.F. Culb.) Krog

Distribution. Kenya, Tanzania, North and Central America (Swinscow & Krog 1988).

Chemistry. Atranorin; lecanoric acid (Swinscow & Krog 1988).

Punctelia subpraesignis (Nyl.) Krog

Distribution. It is known from East Africa and the Americas.

Chemistry. Atranorin; gyrophoric acid (Swinscow & Krog 1988).

Punctelia subrudecta (Nyl.) Krog

Distribution. It is known from East Africa and the Americas.

Chemistry. Atranorin; lecanoric acid (Swinscow & Krog 1988).

Pyrenula acutalis R.C. Harris

Distribution. Tanzania; Luhangalo Plateau and Mountain Uluguru forest. A pantropical species (Harris 1989; Alstrup & Aptroot 2005).

Pyrenula concatervans (Nyl.) R.C. Harris

Distribution. Tanzania; Changwahela, Luhembe River. Coastal + riverine forest. A pantropical species (Alstrup & Aptroot 2005).

Pyrenula confinis (Nyl.) R.C. Harris

Distribution. Tanzania; Ngong Hills, Changwahela Coastal + mountain forest). A pantropical species (Alstrup & Aptroot 2005).

Pyrenula dermatodes (Borrer) Schaer.

Distribution. Luhangalo Plateau and Mountain Uluguru forest. A paleotropical species. Found mainly in Europe and Asia. Known in Macaronesia only from

the Azores and Madeira (Hafellner 1995; Alstrup & Aptroot 2005).

Pyrenula laetior Müll. Arg.

Distribution. Tanzania Pugu Hills, Coastal + low mountain forest. A neotropical species (Alstrup & Aptroot 2005).

Pyrenula macularis (Zahlbr.) R.C. Harris

Distribution. A pantropical species. Tanzania; Matema Beach. Coastal + mountain forest. In Africa; Madagascar and South Africa (Harris 1989; Alstrup & Aptroot 2005).

Pyrenula mamillana (Ach.) Trevis.

Distribution. Tanzania; Sanje Waterfall T, Luhega Forest, Mountain Udzungwa forest. A pantropical species (Alstrup & Aptroot 2005).

Pyrenula microcarpa Müll. Arg. (= *P. cinerea* Zahlbr.)

Distribution. Tanzania; Luhangalo Plateau and Mountain Forest of Uluguru (Harris 1995; Alstrup & Aptroot 2005).

Pyrenula ochraceoflava (Nyl.) R.C. Harris

Distribution. Tanzania; Dar and Kyalungwa. A pantropical species (Alstrup & Aptroot 2005).

Pyrenula parvinuclea (Meyen & Flot.) Aptroot

Distribution. A paleotropical species (Alstrup & Aptroot 2005).

Pyrenula pyrenuloides (Mont.) R.C. Harris

Distribution. Tanzania; Ilutile and Mountain Udzungwa Forest. A neotropical species, not commonly found in Africa (Harris 1989; Alstrup & Aptroot 2005).

Pyrenula quassiaecola Fée

Distribution. Luhega Forest, Matema Beach, Luhangalo Plateau. Coastal + mountain forests of Udzungwa and Uluguru. It is pantropical species, found mainly in tropical America and Asia (Alstrup & Aptroot 2005).

Pyrenula santensis (Nyl.) Müll. Arg.

Distribution. A pantropical species. Tanzania; Luhega Forest, Mountain Udzungwa forest (Alstrup & Aptroot 2005).

Pyrgillus cambodiensis Kashiw., K.H. Moon & Aptroot

Distribution. Cambodia (Singh & Singh 2017) and also known from China.

Pyrgillus javanicus (Mont. & Bosch) Nyl.

Distribution. Tanzania (Tibell 2001; Tibell & Frisch 2010), Madagascar and Kenya as *P. cambodiensis* (Tibell 2001) and USA.

Pyxine berteriana (Fée) Imshaug

Distribution. East Africa; tropical-subtropical species.

Chemistry. Lichexanthone; testacien; triterpenoids (Swinscow & Krog 1988).

Pyxine coccifera (Fée) Nyl.

Distribution. Tanzania, Asia, South America, Australia (Swinscow & Krog 1988).

Chemistry. Lichexanthone; triterpenoids (Swinscow & Krog 1988).

Pyxine cocoes (Sw.) Nyl.

Distribution. A pantropical-subtropical species (Alstrup et al. 2010).

Chemistry. Lichexanthone; triterpenoids (Swinscow & Krog 1988).

Pyxine convexior (Müll. Arg.) Nyl.

Distribution. Kenya, Tanzania, Australia (Swinscow & Krog 1988).

Chemistry. Atranorin; norstictic; triterpenoids (Swinscow & Krog 1988).

Pyxine coralligera Malmé

Distribution. East Africa, Tropical America (Swinscow & Krog 1988).

Chemistry. Atranorin; testacien; triterpenoids (Swinscow & Krog 1988).

Pyxine endochrysin Nyl.

Distribution. Tanzania, Japan (Swinscow & Krog 1988).

Chemistry. Triterpenoids (Swinscow & Krog 1988).

Pyxine katendei Swinscow & Krog

Distribution. Only known from East Africa (Alstrup et al. 2010).

Pyxine kibweziensis Swinscow & Krog

Distribution. The species is only known from East Africa (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Triterpenoids (Swinscow & Krog 1988).

Pyxine lyei Swinscow & Krog

Distribution. Tanzania, known from Kenya and Uganda.

Chemistry. Lichexanthone; triterpenoids (Swinscow & Krog 1988; Alstrup et al. 2010).

Pyxine obscurascens Malmé

Distribution. Tanzania, West Africa, tropical America (Swinscow & Krog 1988).

Chemistry. Atranorin; triterpenoids (Swinscow & Krog 1988).

Pyxine petricola Nyl.

Distribution. A pantropical species (Alstrup et al. 2010).

Chemistry. Atranorin; lichexanthone; triterpenoids (Swinscow & Krog 1988).

Pyxine physciaeformis (Malme) Imshaug

Distribution. Kenya, Tanzania, Brazil (Swinscow & Krog 1988).

Chemistry. Lichexanthone; triterpenoids (Swinscow & Krog 1988).

Pyxine reticulata (Vain.) Vain.

Distribution. East Africa; south Sahara of Africa (Swinscow & Krog 1988).

Chemistry. Atranorin; triterpenoids (Swinscow & Krog 1988).

Pyxine rhodesica Lyngby

Distribution. Tanzania, Zimbabwe, Zambia (Swinscow & Krog 1988).

Chemistry. Atranorin; pigment, triterpenoids (Swinscow & Krog 1988).

Pyxine sorediata (Ach.) Mont.

Distribution. Kenya, Tanzania; mainly in tropical and warm temperate regions (Swinscow & Krog 1988).

Chemistry. Triterpenoids (Swinscow & Krog 1988).

Pyxine subcinerea Stirt.

Distribution. Widespread in tropical to warm temperate regions.

Chemistry. Lichexanthone; triterpenoids (Swinscow & Krog 1988; Alstrup et al. 2010).

Raciborskiella janeirensis (Müll. Arg.) R. Sant

Distribution. Pantropical (Farkas 1987).

Raciborskiella prasina (Müll. Arg.) R. Sant

Distribution. Pantropical species. Republic Guinea, Tanzania, West Africa (Farkas 1987).

Ramalina africana (Stein) C.W. Dodge

Distribution. Known from East Africa, Asia and South America (Alstrup et al. 2010).

Chemistry. Sekikaic acid (Swinscow & Krog 1988).

Ramalina aspera Räsänen

Distribution. Africa and South America (Alstrup et al. 2010).

Chemistry. Boninic acid; cryptochlorophaeic acid (Swinscow & Krog 1988).

Ramalina asperula Kremp.

Distribution. Known from East Africa and South America (Alstrup et al. 2010).

Chemistry. Divaricatic acid; stenosporic acids; sometimes with traces of salazinic acid and usnic acid (Swinscow & Krog 1988; Alstrup et al. 2010).

Ramalina calcarata Krog & Swinscow

Distribution. The species is known only from East Africa.

Chemistry. Divaricatic acid; sometimes with traces of usnic acid (Swinscow & Krog 1988; Alstrup et al. 2010).

Ramalina celastri (Spreng.) Krog & Swinscow

Distribution. Pantropical (Swinscow & Krog 1988; Alstrup et al. 2010).

Ramalina consanguinea Müll. Arg.

Distribution. Kenya, Tanzania (Swinscow & Krog 1988).

Chemistry. Divaricatic acid; norstictic acids (Swinscow & Krog 1988).

Ramalina dendriscooides Nyl.

Distribution. Kenya, Tanzania; widespread in tropical and subtropics (Swinscow & Krog 1988).

Chemistry. Salazinic acid (Swinscow & Krog 1988).

Ramalina cfr. *disparata* Krog & Swinscow

Distribution. Known only from East Africa.

Chemistry. Boninic acid; divaricatic acid; stenosporic acids (Swinscow & Krog 1988).

Ramalina fecunda Krog & Swinscow

Distribution. Kenya, Tanzania (Swinscow & Krog 1988).

Chemistry. Salazinic acid (Swinscow & Krog 1988).

Ramalina cfr. *hoehneliana* Müll. Arg.

Distribution. Known only from East Africa.

Ramalina cfr. *holstii* Krog & Swinscow

Distribution. Known only from East Africa.

Chemistry. Salazinic acid (Swinscow & Krog 1988).

Ramalina maritima Krog & Swinscow

Distribution. Kenya, Tanzania (Swinscow & Krog 1988).

Chemistry. Boninic acid (Swinscow & Krog 1988).

Ramalina nervulosa (Müll. Arg.) Abbayes

Distribution. Distributed in Africa, Asia and Australia (Swinscow & Krog 1988).

Chemistry. Homosekikaic acid; sekikaic acid (Swinscow & Krog 1988; Alstrup et al. 2010).

Ramalina peruviana Ach.

Distribution. East Africa; distributed in tropical and warm temperate regions (Swinscow & Krog 1988).

- Chemistry.** Sekikaic acid aggregate (Swinscow & Krog 1988).
- Ramalina pocsii* Krog & Swinscow
Distribution. Tanzania (Swinscow & Krog 1988).
- Ramalina polymorpha* (Lilj.) Ach.
Distribution. East Africa (Swinscow & Krog 1988).
- Ramalina pusiola* Müll. Arg.
Distribution. Known only from East Africa (Swinscow & Krog 1988).
Chemistry. Homosekikaic acid; sekikaic acid (Alstrup et al. 2010).
- Ramalina reducta* Krog & Swinscow
Distribution. The species is known only from East Africa.
Chemistry. Psoromic acid (Swinscow & Krog 1988).
- Ramalina roesleri* (Schaer.) Hue
Distribution. Tanzania (Swinscow & Krog 1988).
- Ramalina sprengelii* Krog & Swinscow
Distribution. Known only from East and South Africa.
- Relicina limbata* (Laurer) Hale
Distribution. Kenya, Tanzania, central Africa, the Americas, Madagascar (Swinscow & Krog 1988).
- Relicinopsis malaccensis* (Nyl.) Elix & Verdon
Distribution. Tanzania, Kenya, West Africa and Asia.
Chemistry. Protocetraric acids; usnic (Alstrup et al. 2010).
- Roccella endocrocea* M. Choisy
Distribution. Kenya and Tanzania (Swinscow & Krog 1988; Alstrup et al. 2010).
Chemistry. Erythrin (Swinscow & Krog 1988).
- Roccella montagnei* Bél.
Distribution. Known from East Africa and India (Swinscow & Krog 1988; Alstrup et al. 2010).
Chemistry. Erythrin (Swinscow & Krog 1988).
- Rusavskia elegans* (Link) S.Y. Kondr. & Kärnefelt
Distribution. A cosmopolitan species. Widespread in tropical regions (Swinscow & Krog 1988). Abundant throughout much of North America from the desert southwest to the montane and alpine and boreal zones.
Chemistry. Parietina (Swinscow & Krog 1988).
- Solorina spongiosa* (Ach) Anzi
Distribution. Tanzania, North and South America, New Zealand (Swinscow & Krog 1988).
- Sphinctrina tubaeformis* A. Massal.
Distribution. Widely distributed in tropical to warm temperate areas, also known from North America, Australasia, Africa, and Europe (Müller 1894; Temu et al. 2019b).
- Sporopodium lepreurii* Mont.
Distribution. Widespread in tropical areas with dry evergreen and semi-evergreen forests, lowland forest, submontane forests and rocky forests (Farkas 2015).
- Stereocaulon anomalum* I.M. Lamb
Distribution. Kenya, Tanzania, Zaire, Rwanda, Madagascar (Swinscow & Krog 1988; Alstrup & Christensen 2006).
Chemistry. Norstictic acid; stictic acid (Swinscow & Krog 1988).
- Stereocaulon atlanticum* (I.M. Lamb) I.M. Lamb
Distribution. Kenya, Tanzania, Uganda, Zaire, Rwanda, Azores, South Africa, tropical America (Swinscow & Krog 1988).
Chemistry. Atranorin; norstictic acid; perlatoric acid; stictic acid (Swinscow & Krog 1988).
- Stereocaulon humbertii* P.A. Duvign
Distribution. East Africa, Zaire (Swinscow & Krog 1988).
Chemistry. Atranorin (Swinscow & Krog 1988).
- Stereocaulon meyeri* Stein.
Distribution. East and central Africa, South Africa, Madagascar, South America (Swinscow & Krog 1988).
Chemistry. Atranorin; perlatolic acid (Swinscow & Krog 1988).
- Stereocaulon nigromaculatum* P.A. Duvign
Distribution. East and central Africa (Swinscow & Krog 1988).
Chemistry. Atranorin; norstictic acid; stictic acid (Swinscow & Krog 1988).
- Stereocaulon ramulosum* Raesch.
Distribution. East Africa; distributed in the tropics and temperate zone (Swinscow & Krog 1988).
Chemistry. Atranorin; perlatolic acid (Swinscow & Krog 1988).
- Stereocaulon vesuvianum* Pers.
Distribution. East Africa, tropics, arctic and Antarctic regions (Swinscow & Krog 1988).
Chemistry. Atranorin; stictic acid aggregate (Swinscow & Krog 1988).
- Sticta afromontana* Kaasalainen & Rikkinen
Distribution. Kenya and Tanzania (Kaasalainen et al. 2023).

Sticta ambivallaria (Bory) Ach.

Distribution. East Africa, commonly in tropics (Swinscow & Krog 1988; Alstrup & Christensen 2006).

Sticta andina B. Moncada, Lücking & Sérus.

Distribution. Columbia, Hawaii, Azores, Tanzania (Kaasalainen et al. 2023).

Sticta aspratilis Kaasalainen & Rikkinen

Distribution. Kenya and Tanzania (Kaasalainen et al. 2023).

Sticta cellulosa Kaasalainen

Distribution. Tanzania (Kaasalainen et al. 2023).

Sticta ciliata Tayl.

Distribution. Europe, Macaronesia, Colombia, Tanzania (Kaasalainen et al. 2023).

Sticta cyanocaperata Kaasalainen

Distribution. Tanzania (Kaasalainen et al. 2023).

Sticta cyphellulata (Müll. Arg.) Hue

Distribution. Known from Kenya, Tanzania and Australasia (Swinscow & Krog 1988; Alstrup & Christensen 2006).

Sticta dichotoma Delise

Distribution. Known from Tanzania, Madagascar and Mauritius (Swinscow & Krog 1988; Alstrup & Christensen 2006).

Sticta duplombata (Hue) Vain.

Distribution. Tanzania, Western Pacific region (Kaasalainen et al. 2023).

Sticta fuliginoides Magain & Sérus.

Distribution. Europe, Macaronesia, North America, Colombia, Tanzania (Kaasalainen et al. 2023).

Sticta fuliginosa (Hoffm.) Ach.

Distribution. Known from East Africa, with tropical and temperate regions distribution (Swinscow & Krog 1988; Alstrup & Christensen 2006; Kaasalainen et al. 2023).

Sticta limbata (Sm.) Ach.

Distribution. Known from East Africa; widespread in the cooler part of the tropics and in the temperate regions (Swinscow & Krog 1988).

Sticta orbicularis (A. Braun ex Meyen & Flot.) Hue

Distribution. Distributed in Tanzania and Uganda, Reunion and Asia (Swinscow & Krog 1988; Alstrup & Christensen 2006).

Sticta marginalis Bory

Distribution. Réunion and from Madagascar, Tanzania (Kaasalainen et al. 2023).

Sticta munda Kaasalainen

Distribution. Tanzania (Kaasalainen et al. 2023).

Sticta papyracea Delise

Distribution. Tanzania (Swinscow & Krog 1988).

Sticta sublimbata (J. Steiner) Swinscow & Krog

Distribution. East Africa (Swinscow & Krog 1988; Kaasalainen et al. 2023).

Sticta tomentosa (Sw.) Ach.

Distribution. Known from East Africa; tropical distribution (Swinscow & Krog 1988; Alstrup & Christensen 2006; Kaasalainen et al. 2023).

Sticta umbilicariiformis Hochst. ex Flot.

Distribution. North America, Australia, Tanzania (Swinscow & Krog 1988; Kaasalainen et al. 2023).

Sticta variabilis Ach.

Distribution. Widespread in the tropics and subtropics (Alstrup & Christensen 2006).

Sticta weigelii (Ach.) Vain.

Distribution. East Africa; tropical and temperate regions (Swinscow & Krog 1988).

Strigula concreta (Fée) R. Sant.

Distribution. Pantropical (Farkas 1987).

Strigula elegans (Fée) Müll. Arg.

Distribution. Pantropical (Farkas 1987).

Strigula melanobapha (Kremp.) R. Sant

Distribution. Pantropical (Farkas 1987).

Strigula nemathora Mont.

Distribution. Widespread in tropical areas with submontane forests, rocky forests (Farkas 1987, 2015).

Strigula phaea (Ach.) R.C. Harris

Distribution. A nearly cosmopolitan species. Tanzania; Ilutile, Mountain forest (Udzungwa), in Africa only known from the Canary Isles (Roux & Sérusiaux 2004), worldwide; America, Europe and Asia (Alstrup & Aptroot 2005).

Strigula phyllogena (Müll. Arg.) R.C. Harris

Distribution. Widespread in tropical areas with submontane forests and rocky forests (Farkas 2015).

Strigula smaragdula Fr.

Distribution. Widespread in tropical areas with rocky forests (Farkas 2015).

Strigula subtilissima (Fée) Müll. Arg.

Distribution. Widespread in tropical areas with dry evergreen and semi-evergreen forests, lowland forest and rocky forests (Farkas 2015).

Tapellaria phyllophila (Stirt.) R. Sant.

Distribution. Widespread in tropical areas with lowland forests (Farkas 2015).

Teloschistes chrysophthalmus (L.) Th. Fr.

Distribution. East Africa, the tropics and warmer parts of the temperate zone (Swinscow & Krog 1988).

Teloschistes exilis (Michx.) Vain.

Distribution. East Africa, the Americas (Swinscow & Krog 1988; Alstrup et al. 2010).

Teloschistes flavicans (Sw.) Norman

Distribution. Widespread in tropical and warm temperate regions (Swinscow & Krog 1988; Alstrup et al. 2010).

Teloschistes hypoglaucus (Nyl.) Zahlbr.

Distribution. East Africa; Tropical America (Swinscow & Krog 1988).

Teloschistes perrugosus Müll. Arg.

Distribution. Known from East and South Africa and possibly Mexico (Swinscow & Krog 1988; Alstrup et al. 2010).

Trapeliopsis glaucolepidea (Nyl.) Gotth. Schneid.

Distribution. Known from East Africa, Europe and South America (Swinscow & Krog 1988).

Chemistry. Gyrophoric acid (Swinscow & Krog 1988).

Thelenella modesta (Nyl.) Nyl.

Distribution. Tanzania; Morogoro, Sanje Waterfall. Low mountain forest (Uluguru, Udzungwa). Widespread in the Northern Hemisphere; in Africa is known only from subtropical North Africa (Alstrup & Aptroot 2005).

Tricharia dilatata Vězda

Distribution. Widespread in tropical areas with submontane forests (Farkas 2015).

Trypethelium tropicum (Ach.) Müll. Arg.

Distribution. Luhega Forest and Mountain Forest (Udzungwa). A pantropical species in Africa; Sierra Leone (Harris 1984; Alstrup & Aptroot 2005).

Tylophoron moderatum Nyl.

Distribution. Tanzania (Zahlbrucker 1932; Tibell 2001).

Tylophoron protrudens Nyl.

Distribution. Tanzania (Tibell 2001; Alstrup et al. 2010). Widely distributed in tropical/subtropical areas and known also from Rwanda and Zaire (Tibell 1981) and Guinea and Kenya (Tibell 2001).

Umbilicaria africana (Jatta) Krog & Swinscow.

Distribution. Known from East Africa and Zaire (Swinscow & Krog 1988).

Chemistry. Gyrophoric acid (Swinscow & Krog 1988).

Umbilicaria aprina Nyl.

Distribution. A cosmopolitan species (Swinscow & Krog 1988).

Chemistry. Gyrophoric acid (Swinscow & Krog 1988).

Umbilicaria cinereorufescens (Schaer.) Frey

Distribution. Known from East Africa, Europe and North America (Swinscow & Krog 1988).

Chemistry. Gyrophoric acid (Swinscow & Krog 1988).

Umbilicaria decussata (Vill.) Zahlbr.

Distribution. Known from East Africa, Europe, the Americas, Asia, Australia, New Zealand, the Antarctic region (Swinscow & Krog 1988).

Chemistry. Gyrophoric acid (Swinscow & Krog 1988).

Umbilicaria polyphylla (L.) Baumg.

Distribution. Known from East and South Africa, Europe, North America, Asia and New Zealand (Swinscow & Krog 1988).

Chemistry. Gyrophoric acid (Swinscow & Krog 1988).

Umbilicaria soralifera (Frey) Krog & Swinscow

Distribution. Known from East and South Africa (Swinscow & Krog 1988).

Chemistry. Gyrophoric acid (Swinscow & Krog 1988).

Umbilicaria subglabra (Nyl.) Frey

Distribution. Known from East and South Africa, Europe, America, Asia and New Zealand (Swinscow & Krog 1988).

Chemistry. Gyrophoric acid (Swinscow & Krog 1988).

Umbilicaria umbilicarioides (Stein) Krog & Swinscow

Distribution. Known from East and South Africa, Zaire, Patagonia, the antarctic regions (Swinscow & Krog 1988).

Usnea abiscinica Motyka

Distribution. East Africa (Swinscow & Krog 1979, 1988).

Chemistry. Norstictic acid (Swinscow & Krog 1979, 1988).

Usnea acanthera Motyka

Distribution. Tanzania (Swinscow & Krog 1988).

Chemistry. Protocetraric acid (Swinscow & Krog 1988).

Usnea albomaculata Motyka

Distribution. East Africa (Swinscow & Krog 1988).

Chemistry. Fumarprotocetraric acid; norstictic acid; psoromic and consporomic; salazinic (Swinscow & Krog 1988).

Usnea antiqua Swinscow & Krog

Distribution. Tanzania (Swinscow & Krog 1988).

Chemistry. Difractaic acid; salazinic acid; norstictic acid.

Usnea articulata (L.) Hoffm.

Distribution. East Africa (Swinscow & Krog 1988).

Chemistry. Fumarprotocetraric acid \pm protocetraric acid; salazinic acid \pm norstictic acid and/or galbinic acid; psoromic acid \pm barbatic or diffractaic acid; stictic acid aggregate (Swinscow & Krog 1978, 1988).

Usnea baileyi (Stirt.) Zahlbr.

Distribution. Subtropical to tropical (Motyka 1936; Swinscow & Krog 1974, 1988; Truong & Clerc 2013).

Chemistry. Difractaic acid; norstictic acid; protocetraric acid; salazinic acid (Swinscow & Krog 1974, 1988; Temu et al. 2019b).

Usnea bicolorata Motyka

Distribution. East Africa and Zaire (Swinscow & Krog 1979, 1988).

Chemistry. Barbatic acid; protocetraric acid \pm barbatic acid (Swinscow & Krog 1988).

Usnea bornmuelleri J. Steiner

Distribution. East, central and west Africa (Swinscow & Krog 1976b, 1988).

Chemistry. Norstictic acid and/or salazinic; protocetraric acid and/or fumarprotocetraric acid; psoromic and consporomic (Swinscow & Krog 1988).

Usnea chloreoides (Vain.) Motyka

Distribution. East Africa (Swinscow & Krog 1988).

Chemistry. Difractaic acid; salazinic acid (Swinscow & Krog 1988).

Usnea complanata (Müll. Arg.) Motyka

Distribution. According to Swinscow & Krog (1979; 1988) probably widespread in Africa (Alstrup et al. 2010).

Chemistry. Psoromic and consporomic acids; salazinic acid; norstictic acid \pm salazinic acid; galbinic acid with salazinic and norstictic acid accessory; stictic acid aggregate; usnic acid (Swinscow & Krog 1988).

Usnea congdonii Krog

Chemistry. Difractaic acid; protocetraric acid.

Usnea cristata Motyka

Distribution. East Africa (Motyka 1936; Swinscow & Krog 1974, 1988).

Chemistry. Difractaic acid \pm salazinic acid (Swinscow & Krog 1974, 1988).

Usnea elata Motyka

Distribution. West Africa (Swinscow & Krog 1974).

Chemistry. Difractaic acid (Swinscow & Krog 1988).

Usnea exasperata (Müll. Arg.) Motyka

Distribution. East and southern Africa (Swinscow & Krog 1988; Alstrup et al. 2010).

Chemistry. Alectorialic acid; echinocarpic acid Fumarprotocetraric acid \pm protocetraric acid; salazinic acid \pm diffractaic acid; psoromic acid \pm consporomic acids \pm diffractaic and/or barbatic acid; diffractaic acid \pm barbatic acid (Swinscow & Krog 1978, 1988).

Usnea formula (Stirt.) Motyka

Distribution. Kenya, Tanzania and West Africa (Swinscow & Krog 1974, 1988).

Chemistry. Norstictic acid; protocetraric acid; salazinic acid (Swinscow & Krog 1974, 1988).

Usnea gigas Motyka

Distribution. East Africa, Zaire, Madagascar (Swinscow & Krog 1978, 1988).

Chemistry. Constictic acid \pm diffractaic acid; diffractaic \pm barbatic acid; protocetraric acid \pm diffractaic or barbatic acid; salazinic acid (Swinscow & Krog 1978, 1988).

Usnea haumanii Motyka

Distribution. East Africa (Swinscow & Krog 1988).

Chemistry. Fumarprotocetraric acid \pm protocetraric acid (Swinscow & Krog 1976a, 1988).

Usnea implicita (Stirt.) Zahlbr.

Distribution. East Africa, Comoro, Angola, worldwide distribution (Motyka 1936; Swinscow & Krog 1988).

Usnea incrassata Motyka

Distribution. East Africa (Swinscow & Krog 1975, 1979, 1988).

Chemistry. Salazinic acid; protocetraric acid; psoromic acid (Swinscow & Krog 1975, 1988).

Usnea leprosa Motyka

Distribution. East and South Africa (Swinscow & Krog 1975, 1979, 1988).

Chemistry. Salazinic acid; norstictic and galbinic acids; stictic acid; psoromic acid (Swinscow & Krog 1975, 1988).

Usnea liechtensteinii J. Steiner

Distribution. Kenya (Swinscow & Krog 1988). The species has tropical distribution.

Chemistry. Diffractaic acid; norstictic acid; protocetraric acid; salazinic acid (Swinscow & Krog 1974, 1988).

Usnea maculata Stirt.

Distribution. Subsaharan Africa (Swinscow & Krog 1976a, 1976b, 1988; Alstrup et al. 2010).

Chemistry. Protocetraric acid (Swinscow & Krog 1976b, 1988).

Usnea pectinata Taylor

Distribution. Tropical (Ohmura 2001; Temu et al. 2019a, 2022).

Chemistry. Constictic acid, diffractaic acid and protocetraric acid (Ohmura 2001; Temu et al. 2019a, 2022).

Usnea perhispidella J. Steiner

Distribution. East Africa (Swinscow & Krog 1975, 1988).

Chemistry. Norstictic and galbinic acids; stictic acid; psoromic acid (Swinscow & Krog 1975, 1988).

Usnea picta (J. Steiner) Motyka

Distribution. Kenya, Tanzania (Swinscow & Krog 1979, 1988).

Chemistry. Protocetraric acids; salazinic acid \pm constictic acid \pm norstictic; stictic acid (Swinscow & Krog 1988).

Usnea pulvinata Fr.

Distribution. Kenya, Tanzania, Cameroon, Zimbabwe, Madagascar, South Africa, Australia (Swinscow & Krog 1976b, 1988).

Chemistry. Protocetraric acid and /or fumarprotocetraric acid \pm barbatic acid; norstictic acid and /or salazinic acid (Swinscow & Krog 1974, 1976b, 1988).

Usnea rubicunda Stirt.

Distribution. East Africa, widespread in in tropics, subtropics to temperate zones (Swinscow & Krog 1988).

Chemistry. Stictic and constictic acids \pm norstictic acid; salazinic acid and norstictic \pm galbinic acid (Swinscow & Krog 1988).

Usnea sanguinea Swinscow & Krog

Distribution. Known from Tanzania only (Swinscow & Krog 1988).

Chemistry. Norstictic acid; salazinic acid (Swinscow & Krog 1988).

Usnea solediosula (Müll. Arg.) Motyka

Distribution. East Africa; Zaire (Swinscow & Krog 1975, 1988).

Chemistry. Protocetraric acid (Swinscow & Krog 1975, 1988).

Usnea subcristata C.W. Dodge

Distribution. Kenya, Tanzania (Swinscow & Krog 1988).

Chemistry. Diffractaic acid; salazinic acid (Swinscow & Krog 1974, 1988).

Usnea subflorida (Zahbr.) Motyka

Distribution. East Africa, Zaire (Swinscow & Krog 1988).

Chemistry. Norstictic acid; protocetraric acid; salazinic acid (Swinscow & Krog 1988).

Usnea submollis J. Steiner

Distribution. East Africa, Cameroon (Swinscow & Krog 1988).

Chemistry. Norstictic acid; salazinic acid \pm galbinic acid; stictic acid (Swinscow & Krog 1988).

Usnea trichodeoides Vain. ex Motyka

Distribution. East, South and West Africa (Swinscow & Krog 1988).

Chemistry. Barbaric acid; norstictic and/or salazinic acid; protocetraric acid and/or constictic acid (Swinscow & Krog 1978, 1988).

Usnea undulata Stirt.

Distribution. East and South Africa, Madeira (Swinscow & Krog 1988).

Chemistry. Galbinic acid \pm constictic acid \pm salazinic acid; norstictic acid, salazinic acid \pm norstictic acid \pm constictic acid; stictic acid \pm constictic and norstictic acids; protocetraric acids; psoromic and consporomic acids (Swinscow & Krog 1975, 1988).

Usnea welwitschiana Motyka

Distribution. Angola, Kenya.

Chemistry. Protocetraric acid (Motyka 1936; Swinscow & Krog 1974).

Verrucaria praetermissa (Trevis.) Anzi

Distribution. A nearly cosmopolitan species. Tanzania; Mountain forest of Udzungwa. Distributed in America, Europe, Asia and Australia (McCarthy 2001; Alstrup & Aptroot 2005).

Xanthomendoza fallax Søchting, Kärnefelt & S.Y. Kondr.

Distribution. Widespread in tropical regions and throughout temperate to boreal North America (Swinscow & Krog 1988; Lindblom 1997).

Chemistry. Parietina (Swinscow & Krog 1988).

Xanthoparmelia africana Hale

Distribution. Eastern and southern African (Swinscow & Krog 1988).

Chemistry. Salazinic acid \pm norstictic acid; usnic acid (Swinscow & Krog 1988).

Xanthoparmelia annexa (Kurok.) Elix

Distribution. Widely distributed in eastern and southern African regions, Kenya (Alstrup et al. 2010).

Chemistry. Atranorin; lecanoric acid (Alstrup et al. 2010).

Xanthoparmelia antleriformis (Elix) Elix & J. Johnst.

Distribution. East Africa. Australia, South Africa (Elix 1994) and India (Divakar & Upreti 2005).

Chemistry. Consalazinic; norstictic acid; salazinic acid; usnic (Alstrup et al. 2010).

Xanthoparmelia atroventralis (Hale) Hale

Distribution. Eastern and southern African (Swinscow & Krog 1988).

Xanthoparmelia diadeta Hale

Distribution. Eastern and southern African (Swinscow & Krog 1988).

Chemistry. Salazinic acid (Swinscow & Krog 1988).

Xanthoparmelia glomerulata Hale

Distribution. Kenya, Tanzania (Swinscow & Krog 1988).

Chemistry. Stictic acid agg.; usnic acid (Swinscow & Krog 1988).

Xanthoparmelia aff. *keralensis* Hale

Distribution. East Africa, India and South Africa (Divakar & Upreti 2005).

Chemistry. Colensoic acid (in trace) and gyrophoric acid (in trace); stenosporic acid; usnic acid (Alstrup et al. 2010).

Xanthoparmelia kiboensis (C.W. Dodge) Krog & Swinscow

Distribution. East Africa (Swinscow & Krog 1988).

Chemistry. Salazinic acid \pm norstictic acid; usnic acid (Swinscow & Krog 1988).

Xanthoparmelia meruensis Krog & Swinscow

Distribution. Kenya, Tanzania (Swinscow & Krog 1988).

Chemistry. Salazinic acid \pm norstictic acid; usnic acid (Swinscow & Krog 1988).

Xanthoparmelia mexicana (Gyeln.) Hale

Distribution. Tanzania, Kenya, southern North America, Australia, New Zealand and India.

Chemistry. Usnic; consalazinic; salazinic acid; norstictic acid (in trace) (Alstrup et al. 2010).

Xanthoparmelia microspora (Müll. Arg.) Hale

Distribution. East Africa, South America (Hale 1990).

Chemistry. Usnic acid; salazinic acid (Alstrup et al. 2010).

Xanthoparmelia mongaensis (Elix) Elix

Distribution. East Africa. Known from Australia and South Africa (Elix 1994).

Chemistry. Atranorin; stenosporic acid; colensoic acid; divaronic acid (in trace) (Alstrup et al. 2010).

Xanthoparmelia pseudocongensis Hale

Distribution. East Africa. Known from South Africa (Hale 1990) and India (Divakar & Upreti 2005). Also, North America (Beeching 2007).

Chemistry. Salazinic acid; usnic (Alstrup et al. 2010).

Xanthoparmelia subramigera (Gyeln.) Hale

Distribution. East and South Africa, Canary Islands, the Americas (Swinscow & Krog 1988).

Chemistry. Fumarprotocetraric acid \pm protocetraric acid; succinprotocetraric acid; usnic acid (Swinscow & Krog 1988).

Xanthoparmelia tinctina (Maheu & A. Gillet) Hale

Distribution. The species is widespread in tropical and warm temperate regions (Alstrup et al. 2010).

Chemistry. Salazinic acid; usnic (Alstrup et al. 2010).

Xanthoparmelia verruculifera (Nyl.) O. Blanco, A. Crespo, Elix, D. Hawksw. & Lumbsch

Distribution. Tanzania, Kenya, Uganda, Europe and North America, widely distributed species in the Northern hemisphere.

Chemistry. Divaricatic acid (Alstrup et al. 2010).

Xanthoparmelia weberi (Hale) Hale

Distribution. Widespread in tropical regions (Swinscow & Krog 1988). Also, North America (Knudsen et al. 2011).

Chemistry. Hypoprotocetraric acid; 4-O-demethyl notatic acid (Swinscow & Krog 1988; Alstrup et al. 2010).

Xanthoria parietina (L.) Th. Fr.

Distribution. Widespread in tropical regions (Swinscow & Krog 1988).

Chemistry. Parietina (Swinscow & Krog 1988).

Discussion

The Tanzanian lichen research

The few recent studies of Tanzanian lichens have led to new records of lichen species and genera (Temu et al. 2019b). However, the lichens of Tanzania have been underexplored, partly because of the few expert lichenologists in the country. As the present list shows, currently there are 581 species of lichens in 112 genera known from Tanzania. The number of species reported in this study differs from the species counts in checklists of other African countries. It is 33% higher than the number reported for Rwanda (Bock et al. 2007), but 47% lower than the count reported for Morocco (Seaward & Amrani 2022). Most of the species were reported from only five regions of Tanzania: Arusha, Iringa, Kilimanjaro, Morogoro and Tanga (Figure 1), resulting in a gap to be filled by future investigation in the other regions. Out of the 581 species listed here, 28 species are the result of our own recent collections (Temu et al. 2019a, b) and 553 species from other studies.

Given the presence of several montane rainforests, a habitat documented to have very high lichen biodiversity elsewhere (Temu et al. 2019a, b), it is anticipated that the number of species occurring is actually much higher than we report here. We are aware that, when producing this preliminary checklist of the Tanzanian lichens, we may have overlooked some records. The authors appreciate the lacuna and incompleteness of the above list. Our goal is to produce a baseline foundation upon which to build our knowledge of lichen flora in Tanzania. Thus, we encourage a more thorough exploration of the lichens of Tanzania, to supplement this checklist and to contribute further data for a future edition.

Medicinal potential of lichens

Lichens produce a diversity of secondary metabolites, and almost all are unique to lichenized fungi. Many secondary substances reported from the lichen species listed here have been reported to exhibit potent bioactivity. For example, atranorin is known for its antioxidant activity. Further, atranorin, fumarprotocetraric, gyrophoric, lecanoric, physodic, protocetraric, stictic and usnic acids have been reported for their antimicrobial activity against various bacteria and fungi which act as human, animal and plant pathogens (Ranković & Mišić 2008). Compounds such as atranorin, diffractaic, lecanoric, norstictic, protocetraric, salazinic, secalonin, usnic acid and lichexanthone have been found to be active against *Mycobacterium tuberculosis* (Honda et al. 2010). One or more of these substances are present in many of our Tanzanian lichens, suggesting that they may represent a huge pharmacological potential just waiting to be explored.

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