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New records for the lichen flora of Rwanda, East Africa

Abstract

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69 lichen species are recorded as new to Rwanda. *Catillaria alba, Chaenotheca stemonea* and *Parmotrema neotropicum* are new to Africa, *Caloplaca ferruginea* to tropical Africa. *Cetrariastrum vexans* previously has only been reported from Mt Kenya; for *Ramalina roesleri* it is the second known locality in Africa. A short history of the lichenological exploration as well as an overview of the vegetation of Rwanda is presented.

Introduction

Rwanda, a small East African country, which covers only 26 000 km², is situated about 1-2° south of the equator. Due to its diverse geomorphology and altitudinal range, it harbours a species-rich mosaic of montane rainforests, afroalpine vegetation, dry forests and savannahs (Fischer & Hinkel 1991, 1992, Fischer 1993). The vascular plants are comparatively well known (Troupin 1978-88, Fischer 1996) and comprise about 3500 species, including 45 local endemics. In contrast to this number, only 62 lichen species are known (Lindau 1914, Thell 2002). During the last decades, natural vegetation has considerably decreased due to overpopulation and civil war. Today 10 % of the surface are protected as National Parks (Volcano Park, Nyungwe Forest, Akagera National Park). Since 1984, the biodiversity of Rwanda has been investigated by the second author, and besides research on vascular plants and bryophytes, about 2000 specimens of lichens have been collected. The present paper is the first part of an intended series on the lichen flora of Rwanda and it contains new records of some conspicuous species.

History of lichenological exploration in Rwanda

Until 1907, Rwanda was almost unknown concerning its flora and fauna. During the expedition of Graf von Goetzen (1895) apparently no lichens were collected. Richard Kandt (1914, see Bindseil 1988), who lived in Rwanda as private naturalist and later as the Imperial resident for Rwanda, made some botanical collections, unfortunately only phanerogams.

In 1907 Adolf-Friedrich Herzog zu Mecklenburg started an expedition, which mainly intended to explore Rwanda and the eastern Belgian Congo. He was accompanied by several scien-

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tists, among them the botanist Johannes Mildbraed and the zoologist Hermann Schubotz (Mecklenburg 1909). They went by train to Lake Victoria, marched to the northeast of Rwanda, where they collected at Lake Mohasi (see Bamps 1975). After having visited the court of King Yuhi V. Musinga, Mildbraed and Schubotz left the expedition for about two weeks in order to collect plants and animals in the Nyungwe Forest (= Rugege Wald). Until March 1908, Mildbraed visited Lake Kivu and the Virunga Volcanoes, afterwards the eastern Congo (Ituri, Aruwimi) and the Ruwenzori. In May 1908 the expedition went down the river Congo with a steam boat to the Atlantic Ocean. They arrived at Hamburg on 30 June 1908. The scientific results were published until 1925. The botanical volume, edited by Mildbraed (1910-14), covered 718 pages. The lichens were studied by Lindau (Pp. 101-110. 1910 in Mildbraed 1910-14), who recognized 22 species, including eight new taxa.

From 1933 to 1935 the Belgian zoologist de Witte collected in the Albert National Park (today Parc National Virunga in Congo and Parc National des Volcans in Rwanda) and so did the botanist Lebrun from 1937 to 1938. Their collections are housed at Meise (BR), but no publications based on these gatherings are available. Duvigneaud (1955) published a treatment of *Stereocaulon*. The Swiss botanist Stauffer made extensive collections in the Virunga Volcanoes in 1954-55, but mainly on the Congolese side. The *Usnea* species were studied by Motyka (1959) and an overview of his findings was published by Frey (1967).

After the independence of Rwanda, only a few botanists continued to work in this phytogeographically interesting region. During botanical exploration for the "Flore du Rwanda, Spermatophytes" (Troupin 1978-88), Troupin collected mainly flowering plants but also some more conspicuous macrolichens. In 1971, 1972, 1974 and 1980, Lambinon collected mainly lichens during a research programme on the flora and vegetation of the Virunga Volcanoes and Kahuzi-Biega. Most of his collecting sites in Rwanda are situated in Nyungwe Forest, on the Virunga Volcanoes and in Butare. Some results were published by Lambinon & Sérusiaux (1977, 1981, 1983) and Sérusiaux (1978, 1979a-b, 1981, 1984, 1989).

As a result of these activities, 62 species of lichens have reported so far from Rwanda, the lichen flora thus having remained almost unknown (Thell 2002). However, there are numerous determined collections made by Lambinon, which are housed in Liège (LG) but have not been published up to now. From 1988 to 2002 the second author studied the lichens of Rwanda and was the first to collect in remote sites such as Cyamudongo Forest, Busaga Forest, Ibanda Makera and lichenologically undercollected regions. In spring and autumn 2003, the first author could collect lichens mainly in the Nyungwe Forest and on the Virunga Volcanoes.

Vegetation of Rwanda

Nyungwe Forest. – The Nyungwe (former name Rugege) Forest, situated at the eastern crest of the Central African Rift, shows a diverse vegetation mosaic (Fischer & Hinkel 1990, 1991, 1992).

In the lower montane forest belt there are forest communities with dominating *Parinari excelsa* and *Carapa grandiflora* as well as a *Newtonia buchanani* forest with an upper tree layer of 35-40 m. As an endemic tree species, the *Clusiaceae Pentadesma reyndersii* occurs.

Around swamps such as the Kamiranzovu, a typical swamp forest with *Syzygium guineense* subsp. *parvifolium, Carapa grandiflora, Anthocleista grandiflora* and *Podocarpus latifolius* is developed. Within the swamp, an open moorland vegetation with dominating *Cyperus latifolius* is found. Scattered old trees, partly decaying, provide suitable habitats for *Calicium* and *Chaenotheca* species. The open cliffs and the wet flush vegetation near Karamba is also remarkable for their richness in bryophytes (e.g. *Sphagnum* spp., *Breutelia stuhlmannii, Plicanthus hirtellus* and *Anastrophyllum piligerum*) and lichens.

The medium montane forest belt is developed near Uwinka, with *Ocotea michelsonii, Syzygium guineense, Beilschmiedia rwandensis, Macaranga neomildbraediana* and *Balthasarea schliebenii*. In the eastern part of Nyungwe, secondary forests with *Macaranga* and *Neoboutonia macrocalyx* dominate.

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The Rwasenkoko swamp as an example of a night-cold air lake has an inverse profile with *Syzygium-Podocarpus-Ocotea* forest on the summit of the hills, and slopes bearing *Andropogon shirensis* grassland with scattered shrubs of *Hagenia abyssinica* and *Erica rugegensis*. In the valley, moorland and swamps with *Alchemilla johnstonii, Lobelia mildbraedii* and *Cyperus denudatus* can be observed.

The upper montane forest belt consists mainly of ericaceous woodland. The summit of Mt Bigugu bears stands of *Erica rugegensis* and *E. johnstonii*. Dense ericaceous shrub with *Erica johnstonii* is also developed in the western part of Rwasenkoko swamp.

Virunga Volcanoes. – The Virunga Volcanoes are situated at the border of Congo-Kinshasa, Uganda and Rwanda, thus previous records of lichens cannot always be assigned to either Congo or Rwanda (e.g. Frey 1967). Mt Karisimbi, with 4507 m, is the highest peak of Rwanda.

From 2700 to 3000 m a secondary *Dombeya* forest with scattered *Hagenia* is developed, followed by a *Hagenia-Hypericum* belt from 3000 to 3300 m, with large epiphytic moss cushions. On the saddle of Karisimbi at 3400 m a moorland with *Dendrosenecio adnivalis* and *Erica johnstonii* occurs, while around Lake Muderi a *Sphagnum* peat bog with *Carex runssorensis* is developed.

Above 3400 m a *Dendrosenecio adnivalis-Hypericum revolutum* subparamo can be observed. The subparamo can be divided into two types, the *Dendrosenecio adnivalis-Lobelia stuhlmannii* subparamo from 3600 to 3900 m and the *Dendrosenecio adnivalis-Lobelia wollastoni* subparamo from 3900 to 4200 m.

Above 4200 m no more giant groundsels are found and nearly pure meadows of *Alchemilla johnstoni* are developed. The summit at 4500 m is covered by an alpine desert, where bryophytes and lichens are dominating. On Mt Bisoke, reaching 3711 m, the *Hagenia-Hypericum* zone is followed by a *Hypericum-Lobelia gibberoa* zone from 3200 to 3350 m, above, a *Hypericum-Lobelia stuhlmannii* subparamo reaches about 3500 m altitude. The afroalpine vegetation on Mt Bisoke is mainly composed of *Dendrosenecio adnivalis, Lobelia stuhlmannii, Deschampsia flexuosa* and *Huperzia saururus*.

Akagera National Park and adjacent savannahs. – The eastern part of Rwanda is covered by a mosaic of dry forests and savannahs. Rock outcrops are either ferricretes with *Craterostigma plantagineum, C. lanceolatum, Loudetia kagerensis* and *Microchloa kunthii,* or quartzitic and granitic inselbergs. In small rock pools a temporary vegetation with *Isoëtes abyssinica, Marsilea minuta, Rotala tenella, Callitriche oreophila, Schoenoplectus microglumis, Dopatrium dortmanna, Aponogeton stuhlmannii* and *A. vallisnerioides* is found (Porembski & al. 1997). Large quartzitic outcrops can be observed in the southeast, where open rock surfaces and fissures are colonized by a diverse lichen flora. Some specialists such as the endemic *Streptocarpus bindseilii* and *Stemodiopsis ruandensis* (Hinkel & Fischer 1999) and the shrubs *Parinari curatellifolia* and *Protea madiensis* are found. The main part of the Akagera National Park is covered by tree savannah with scattered *Acacia sieberiana* var. *kagerensis, A. senegal, Lannea humilis, L. stuhlmannii, Entada abyssinica, Rhamnus staddo, Ozoroa reticulata, Albizia petersiana* and *Rhus natalensis*. Dominating grasses are *Hyparrhenia* spp., *Sporobolus infirmus* and *Themeda triandra*. Small hillsides are covered with dense dry forests rich in epiphytes (e.g. *Usnea* spp., *Ramalina hoehneliana*, orchids such as *Aerangis verdickii, Microcoelia globulosa* and *Ansellia africana*). Dominating trees are *Haplocoelum gallaense, Strychnos usambarensis, Canthium lactescens* and *Nuxia congesta*.

Material and methods

The study is based on material collected by the authors since 1988 and mainly 1999-2003 as well as on the collections made by J. Lambinon from 1971 to 1980. In the list of new records, the previously unpublished material of J. Lambinon is included. The specimens examined are housed in Koblenz (KOBL) and Liège (LG) and duplicates of the Koblenz collections will be deposited in Butare, Rwanda. Identification and nomenclature is mainly based on Swinscow & Krog (1988).

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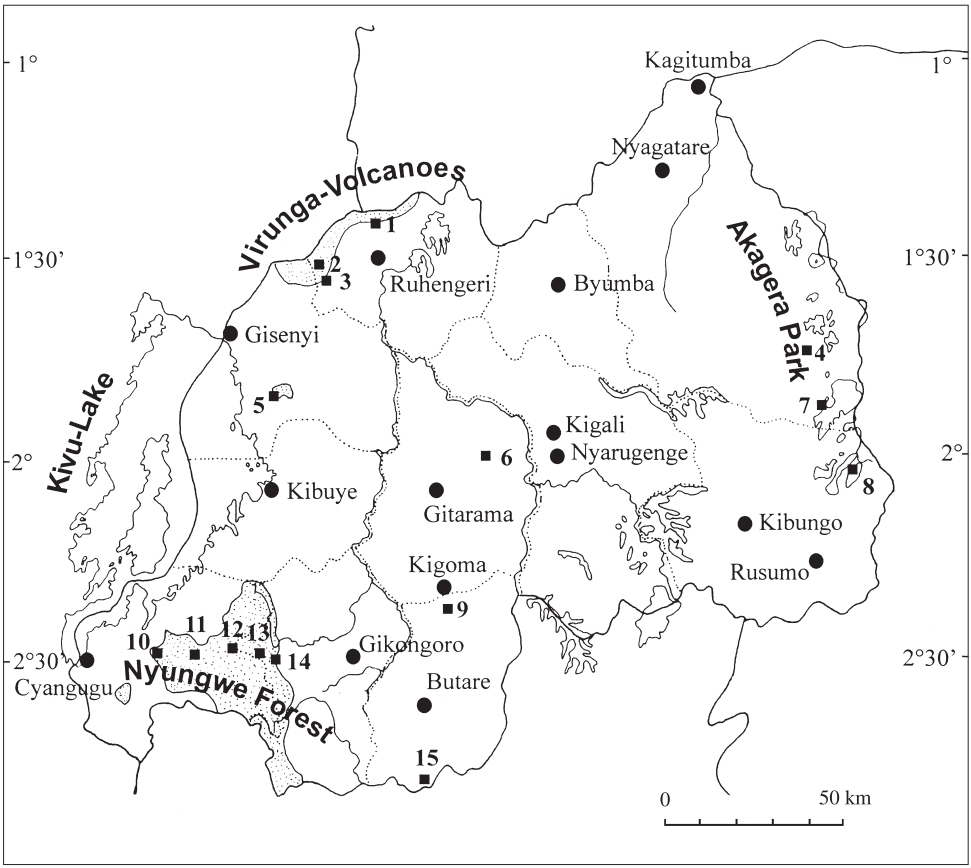


Fig. 1. Map of Rwanda showing province capitals and main collecting localities – 1: Kirimbi, Mt Gahinga; 2 + 3: Mt Bisoke, Karisoke; 4: Rwisirabo; 5: Gikungu; 6: Kamonyi, Rugobagoba; 7: Lac Ihema; 8: Lac Mpanga; 9: ISAR Songa; 10: Gisakura; 11: Kamiranzovu; 12: Mt Bigugu; 13: Rwasenkoko; 14: Kitabi; 15: Vallée de Gatobwe.

The localities are arranged according to geographical divisions of Rwanda following Fischer & Hinkel (1991, 1992) and shown in Fig. 1.

List of new lichen records

The following list comprises new records of lichens for Rwanda in alphabetical order. The known distribution for each species precedes the description of the new localities. If not indicated otherwise, the specimens are housed in Koblenz (KOBL).

Anzia afromontana R. Sant.
Montane forests of Ethiopia, Kenya, Uganda and Tanzania. – NYUNGWE FOREST: Rwasenkoko, on *Erica rugegensis,* 17.3.2003, *Killmann & Fischer.*

Bulbothrix hypochraea (Vain.) Hale
W, E and S Africa, South America. – CENTRAL PLATEAU: Butare, experimental field PASI, 25.3.2002, *Fischer.*

Bulbothrix isidiza (Nyl.) Hale
Pantropical. – CENTRAL PLATEAU: Butare, road side trees, 23.3.2002, *Fischer.*

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Bulbothrix sensibilis (Steiner & Zahlbr.) Hale
W to S Africa, South America; in E Africa known from Kenya and Tanzania. – CENTRAL PLATEAU: Butare, experimental field PASI, 18.10.2000, *Fischer & Kunsmann.*

Bunodophoron melanocarpum (Sw.) Wedin
Widespread in tropical montane and temperate regions. – VIRUNGA VOLCANOES: Mt Bisoke, on *Hypericum revolutum,* 19.9.2002, *Fischer.* – NYUNGWE FOREST: Rwasenkoko, ericaceous shrub, on *Hagenia abyssinica,* 14.10.2000, *Fischer & Kunsmann;* Kamiranzovu, 12.9.2002, *Fischer;* forèt de Rugege (= Nyungwe), Ruwankuba, 19.12. 1971, *Lambinon 71/Rw/1089* (LG); ibid., entre Karamba et Gisakura, 1.9.1974, *Lambinon 74/1035* (LG); ibid., entre la route Butare - Cyangugu et le Kamiranzovu, 18.8.1974, *Lambinon 74/913* (LG).

Caloplaca ferruginea (Huds.) Th. Fr.
Widespread in the northern hemisphere and so far known in Africa only from Morocco (Burgaz & al. 2002) and S Africa (Feuerer 2003). It is reported here as new to tropical Africa. – CENTRAL PLATEAU: Butare, experimental field PASI, 25.3.2002, *Fischer* (det. E. Sérusiaux).

Candelaria concolor (Dicks.) B. Stein
Widespread and nearly cosmopolitan. – AKAGERA REGION: Akagera National Park, Rwisirabo, 9.2002, *Fischer;* Umutara, Bubare-Nyagatare, 6.10.1999, *Fischer.* – CENTRAL PLATEAU: Kigali, Kininya, 8.1988, *Fischer;* Butare, road side trees, 23.3.2002, *Fischer;* Butare, garden of IRST, 13.10. 2000, *Fischer & Kunsmann.*

Candelaria fibrosa (Fr.) Müll. Arg.
Widespread in the tropics and subtropics. – CENTRAL PLATEAU: Butare, campus of National University, 3.2002, *Fischer;* Butare, experimental field PASI, 18.10.2000, *Fischer & Kunsmann;* Butare, garden of IRST, 12.10.2000, *Fischer & Kunsmann.*

Canoparmelia aptata (Kremplh.) Elix & Hale
In Africa previously recorded from Ethiopia, Tanzania and S Africa. – CENTRAL PLATEAU: Prov. Butare, Kanzi Hill at Nyaruhengeri, on open earthbank in *Eucalyptus* plantation, 3.4.2003, *Killmann* (det. J. A. Elix).

Canoparmelia crozalsiana (Harm.) Elix & Hale
Widespread in S Europe and tropical regions. – VIRUNGA VOLCANOES: Foot of Mt Bisoke, on mossy trunk, 25.3.2003, *Killmann;* Ruhengeri, garden of Hotel Muhabura, 25.3.2003, *Killmann & Fischer* (det. J. A. Elix).

Canoparmelia nairobiensis (J. Steiner & Zahlbr.) Elix & Hale
Widespread in W and E Africa. – VIRUNGA VOLCANOES: Foot of Mt Gahinga, on *Maesa lanceolata*, 22.3.2003, *Killmann.* – CENTRAL PLATEAU: Garden of IRST, Butare, 14.10.1999, *Fischer* (det. J. A. Elix).

Canoparmelia texana (Tuck.) Elix & Hale
Widespread in temperate and tropical regions. – CENTRAL PLATEAU: Butare, experimental field PASI, on *Grevillea robusta*, 25.3.2002, *Fischer* (det. J. A. Elix).

Catillaria alba Coppins & Vězda
Widespread in Europe. This species has originally been described from a subalpine habitat in Austria (Coppins & Vězda in Vězda 1993). – VIRUNGA VOLCANOES: Mt Bisoke, on leaves of *Huperzia saururus* in the paramo at 3600 m, 19.9.2002, *Fischer* (det. E. Sérusiaux).

Cetrariastrum sorocheilum (Vain.) W. Culb. & C. Culb.
Widespread in tropical and warm temperate regions. – VIRUNGA VOLCANOES: Mt Bisoke, on *Hypericum revolutum* and *Erica johnstonii,* 19.9.2002, *Fischer;* Karisoke, on *Hagenia abyssinica,* 17.9.2002, *Fischer*. – NYUNGWE FOREST: Rwasenkoko, on *Cliffortia nitidula*, 14.10.2000, *Fischer & Kunsmann*.

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Cetrariastrum vexans (Zahlbr.) W. Culb. & C. Culb.
Central and South America, Asia, in Africa previously only known from Mt Kenya. – VIRUNGA VOLCANOES: Mt Bisoke, on *Hypericum revolutum,* 19.9.2002, *Fischer.* – NYUNGWE FOREST: Rwasenkoko, ericaceous shrub, on *Hagenia abyssinica,* 14.10. 2000, *Fischer & Kunsmann*.

Chaenotheca furfuracea (L.) Tibell
In Africa previously known only from Tanzania. – VIRUNGA VOLCANOES: Mt Bisoke, *Hypericum* zone, on *Hagenia abyssinica,* 23.3.2003, *Killmann & Fischer;* Mt Bisoke, near National Park border, on *Hagenia abyssinica,* 23.3.2003, *Killmann & Fischer*.

Chaenotheca chrysocephala (Ach.) Th. Fr.
In Africa previously known only from Kenya and the Congolese side of the Virunga volcanoes (Frisch 1999). – VIRUNGA VOLCANOES: Karisoke, on *Hagenia abyssinica,* 23.3.2003, *Killmann & Fischer*.

Chaenotheca stemonea (Ach.) Müll. Arg.
Widespread in cool temperate to temperate regions of both hemispheres. New to Africa. – VIRUNGA VOLCANOES: Karisoke, on *Hagenia abyssinica,* 17.9.2002, *Fischer*.

Chrysothrix xanthina (Vain.) Kalb
Widespread in the tropical and subtropical regions; in Africa previously known only from Kenya (Kalb 2001). – VIRUNGA VOLCANOES: Karisoke, on *Hagenia abyssinica,* 17.9.2002, *Fischer* (det. E. Sérusiaux). – CENTRAL PLATEAU: Butare, experimental field PASI, on *Eucalyptus* sp., 13.10.2000, *Fischer & Kunsmann;* Butare, garden of IRST, on *Grevillea robusta,* 12.10.2000, *Fischer & Kunsmann;* Butare, campus of National University, 3.2002, *Fischer;* Prov. Butare, Kanzi Hill at Nyaruhengeri, on *Eucalyptus* sp., 3.4.2003, *Fischer.* – AKAGERA REGION: Umutara, Butare-Kizinga, on *Acacia* sp., 6.10.1999, *Fischer;* Umutara, Bubare-Nyagatare, 6.10.1999, *Fischer;* Kibungu, peninsula Mpanga, on *Haplocoelum gallaense,* 4.1987, *Fischer*.

Dibaeis holstii (Müll. Arg.) Kalb & Gierl
Widespread in the tropics; in E Africa known from Uganda, Kenya, Tanzania and Malawi. *Dibaeis holstii* has previously not been distinguished from *D. baeomyces* (= *Baeomyces roseus*). All records of *Baeomyces roseus* from E Africa (Swinscow & Krog 1988) refer to this species (Gierl & Kalb 1993). – NYUNGWE FOREST: Rwasenkoko, 14.10.2000, *Fischer & Kunsmann* (det. E. Sérusiaux). – CENTRAL PLATEAU: Gatobwe valley near border of Burundi, 24.3.2002, *Fischer*.

Dirinaria applanata (Fée) Awashti
Pantropical species. – CENTRAL PLATEAU: Butare, experimental field PASI, 13.10.2000, *Fischer & Kunsmann;* Butare, garden of IRST, 17.10.2000, *Fischer & Kunsmann.* – NYUNGWE FOREST: Gisakura, on solitary *Strombosia scheffleri,* 20.10.2000, *Fischer & Kunsmann.*

Dirinaria complicata Awashti
Known from Uganda, Kenya, Tanzania and Madagascar. – AKAGERA REGION: Mpanga, between Lake Cyambwe and Lake Mpanga, on *Haplocoelum gallaense,* 8.1988, *Fischer*.

Flavopunctelia flaventior (Stirton) Hale
Widespread in the tropics and extending into temperate regions. – VIRUNGA VOLCANOES: Mt Bisoke, near National Park border, on *Cupressus lusitanica,* 23.3.2003, *Killmann & Fischer*.

Heterodermia comosa (Eschw.) Follm. & Rédon
Widespread in the tropics. – LAKE KIVU: Rutsiro, Préf. Kibuye, 28.7.1974, *Lambinon 74/598* (LG). – AKAGERA REGION: Bugesera, Karama, 12.3.1972, *Lambinon 72/Rw/1082* (LG); ibid., 12.3.1972, *Lambinon 72/Rw/ 1085* (LG); Akagera National Park, Rwisirabo, 9.2002, *Fischer;* Rusumo, en aval des chutes, 16.10.1974, *Lambinon 74/1619* (LG); Parc National de l'Akagera, rive sud-ouest du Lac Ihema, 13.1.1972, *Lambinon 72/Rw/180* (LG); ibid., 13.1.1972, *Lambinon 72/Rw/182* (LG). – CENTRAL PLATEAU: Butare, experimental field PASI, 13.10.2000, *Fischer &*

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Kunsmann; Butare, Parc de l'INRS, 20.7.1974, *Lambinon 74/415* (LG); Ntyazo, route de Kiberizi, 10.4.1980, *Lambinon 80/324* (LG); Gakoma, sud de la commune de Muyaga, 9.4.1980, *Lambinon 80/252* (LG); ibid., 9.4.1980, *Lambinon 80/266* (LG).

Heterodermia hypochraea (Vain.) Swinscow & Krog
South America, Asia; in Africa previously known only from Uganda. – NYUNGWE FOREST: Rwasenkoko, on *Cliffortia nitidula*, 14.10.2000, *Fischer & Kunsmann;* Kamiranzovu, swamp edge, on *Hypericum revolutum*, 3.2003, *Killmann & Fischer.*

Heterodermia hypoleuca (Vain.) Swinscow & Krog
North America, Asia, widespread in E Africa. – CENTRAL PLATEAU: Butare, garden of IRST, 12.10.2000, *Fischer & Kunsmann*. – NYUNGWE FOREST: W Kitabi, on *Macaranga neomildbraediana,* 20.10.2000, *Fischer & Kunsmann*.

Heterodermia lutescens (Kurok.) Follm.
Widespread in the tropics and subtropics. – NYUNGWE FOREST: Gisakura, on solitary *Strombosia scheffleri,* 20.10. 2000, *Fischer & Kunsmann*.

Heterodermia obscurata (Nyl.) Trevisan
Pantropical with extension to temperate regions. – LAKE KIVU: Mbirizi, Préf. Cyangugu, 19.8.1974, *Lambinon 74/971* (LG). – CENTRAL PLATEAU: Butare, garden of IRST, 12.10.2000, *Fischer & Kunsmann;* Butare, Parc de l'INRS, 26.12.1975, *Reekmans 4681* (LG). – AKAGERA REGION: Parc National de l'Akagera, rive sud-ouest du Lac Ihema, 13.1.1972, *Lambinon 72/Rw/173* (LG).

Heterodermia speciosa (Wulfen) Trevisan
Cosmopolitan. – CENTRAL PLATEAU: Butare, experimental field PASI, 19.10.2000, *Fischer & Kunsmann.*

Heterodermia vulgaris (Vain.) Follm. & Redón
Tropical America, E and S Africa. – CENTRAL PLATEAU: Butare, campus of National University, 3.2002, *Fischer*.

Hypogymnia physodes (L.) Nyl.
Widespread in the northern hemisphere; in tropical Africa previously only known from Kenya. – NYUNGWE FOREST: Rwasenkoko, ericaceous shrub, on *Hagenia abyssinica,* 2400 m, 14.10.2000, *Fischer & Kunsmann.*

The locality is situated at a remarkable low altitude. Otherwise *Hypogymnia physodes* has not been recorded below 3000 m in E Africa (Swinsow & Krog 1988). The Rwasenkoko swamp is a cold-air lake with a vegetation profile inversion (see introducing notes on the vegetation), where temperatures below 0 °C can be recorded at night.

Hypotrachyna ducalis (Jatta) Hale
Central and E Africa, Asia. – NYUNGWE FOREST: Pindura, 16.10.1999, *Fischer* (det. J. A. Elix).

Hypotrachyna neodissecta (Hale) Hale
South America, Asia, W and E Africa. – NYUNGWE FOREST: Rwasenkoko, on *Erica rugegensis,* 14.10.2000, *Fischer & Kunsmann.*

Leptogium phyllocarpum (Pers.) Mont.
Pantropical. – CENTRAL PLATEAU: Butare, garden of IRST, 12.10.2000, *Fischer & Kunsmann;* Butare, Parc de l'INRS, 20.7.1974, *Lambinon 74/409* (LG); Gakoma, sud de la commune de Muyaga, 9.4.1980, *Lambinon 80/267* (LG). – GISHWATI FOREST: Vallée de la Sebeya, 3 km au sud du poste minier de Gikungu, 30.7.1974, *Lambinon 74/668* (LG); Gikungu, vallée de la Bikeneko, 24.7.1974, *Lambinon 74/492* (LG). – NYUNGWE FOREST: Rwasenkoko, on *Erica rugegensis,* 14.10.2000, *Fischer & Kunsmann;* forèt de Rugege (= Nyungwe), 19.12.1971, Ruwankuba, *Lam-*

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binon 71/Rw/1072 (LG); ibid., km 59 route Butare to Cyangugu, 18.12.1971, *Lambinon 71/Rw/1054* (LG).

Nephroma tropicum (Müll. Arg.) Zahlbr.
Pantropical. – NYUNGWE FOREST: Kamiranzovu, 5.4.2002, *Fischer;* forèt de Rugege (= Nyungwe), versant sud du Mont Muzimu, 3.3.1972, *Lambinon 72/Rw/949* (LG); ibid., vers le km 107 route Butare-Cyangugu, 15.8.1974, *Lambinon 74/846* (LG); ibid., km 64 route Butare-Cyangugu, sous le gîte Rutavu, 9.3.1972, *Lambinon 72/Rw/1033* (LG); ibid., Ruwankuba, 19.12.1971, *Lambinon 71/Rw/1078* (LG); ibid., 19.12.1971, *Lambinon 71/Rw/1090* (LG).

Pannaria rubiginosa (Ach.) Bory
In temperate and tropical montane regions. – VIRUNGA VOLCANOES: Karisoke, on *Cornus volkensii* in the *Hagenia-Hypericum* zone, 23.3. 2003, *Killmann & Fischer;* Birunga, entre Kinigi et le pied de Gahinga, 26.2.1972, *Lambinon* 72/Rw/919 (LG).

Parmelinopsis horrescens (Tayl.) Elix & Hale
Widespread in temperate and tropical regions. – NYUNGWE FOREST: Rwasenkoko, on *Erica johnstonii,* 17.3.2003, *Killmann & Fischer* (det. J. A. *Elix).*

Parmotrema abessinicum (Kremp.) Hale
Known from Ethiopia, Uganda, Kenya and Tanzania. – CENTRAL PLATEAU: Butare, garden of IRST, 14.10.1999, *Fischer* (det. J.A. Elix).

Parmotrema andinum (Müll. Arg.) Hale
South America, Asia, E Africa. – NYUNGWE FOREST: W Kitabi, on *Macaranga neomildbraediana,* 20.10. 2000, *Fischer & Kunsmann;* Forèt de Rugege (= Nyungwe), route Pindura to Bweyeye, 16.8.1974, *Lambinon 74/884* (LG).

Parmotrema austrosinense (Zahlbr.) Hale
Widespread in temperate and tropical regions. – CENTRAL PLATEAU: Butare, garden of IRST, 12.10.2000, *Fischer & Kunsmann.* – NYUNGWE FOREST: Forèt de Rugege (= Nyungwe), colline entre le Mt Muzimu et le Bigugu, 5.3.1972, *Lambinon 72/Rw/1024* (LG); Gisakura, trees at tea plantation, 15.10.2000, *Fischer & Kunsmann*.

Parmotrema cooperi (Steiner & Zahlbr.) Sérus.
Widespread in the tropics. – NYUNGWE FOREST: Mt Bigugu, on *Podocarpus latifolius*, 3.2003, *Fischer* (det. J. A. Elix).

Parmotrema crinitum (Ach.) M. Choisy
Widespread in temperate and tropical regions. – NYUNGWE FOREST: Rwasenkoko, on *Cliffortia nitidula*, 14.10.2000, *Fischer & Kunsmann*.

Parmotrema cristiferum (Tayl.) Hale
Widespread in tropics and subtropics. – VIRUNGA VOLCANOES: Cyanika, on lava rocks, 2200 m, 21.10.2000, *Fischer & Kunsmann* (det. J. A. Elix).

Parmotrema defectum (Hale) Hale
E Africa, Madagascar. – AKAGERA REGION: Quartzitic rocks at Nyarubuye, 9.10.1999, *Fischer* (det. J. A. Elix).

Parmotrema hababianum (Gyeln.) Hale
The Americas, Asia, E Africa. – CENTRAL PLATEAU: Butare, garden of IRST, 12.10.2000, *Fischer & Kunsmann*.

Parmotrema mellissii (Dodge) Hale
Widespread in tropical and warm temperate regions. – NYUNGWE FOREST: Rwasenkoko, 15.10. 1999, *Fischer* (det. J. A. Elix).

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Parmotrema neotropicum Kurok.
Previously only known from the Neotropics. Here recorded as new to Africa. – CENTRAL PLATEAU: Butare, on roadside tree, 23.3.2002, *Fischer* (det. J. A. Elix).

Parmotrema poolii (Dodge) Krog & Swinscow
Madagascar, Asia, Australia, in Africa known from Kenya and Tanzania. – NYUNGWE FOREST: Gisakura, on solitary *Strombosia scheffleri,* 15.10. 2000, *Fischer & Kunsmann*.

Parmotrema soyauxii (Müll. Arg.) Hale
Widespread in tropical Africa and Madagascar. – AKAGERA REGION: Quartzitic rocks near Ntaruka, 8.9.2002, *Fischer* (det. J. A. Elix).

Parmotrema tinctorum (Nyl.) Hale
Widespread in tropical and temperate regions. – NYUNGWE FOREST: Gisakura, trees at tea plantation, 15.10.2000, *Fischer & Kunsmann* (det. J. A. Elix). – CENTRAL PLATEAU: Butare, on roadside trees and on roadbank, 23.3.2002, *Fischer* (det. J. A. Elix).

Phaeophyscia hispidula (Ach.) Moberg
Widespread in the tropics and subtropics. – CENTRAL PLATEAU: Kigali, Kininya, 8.1988, *Fischer;* Butare, campus of National University, 3.2002, *Fischer;* Butare, experimental field PASI, 19.10.2000, *Fischer & Kunsmann*.

Pseudocyphellaria aurata (Ach.) Vain.
Widespread in the tropics and extending into temperate regions. – AKAGERA REGION: Umutara, Kagitumba, gallery forest, 7.10.1999, *Fischer.* – NYUNGWE FOREST: Gisakura, 13.9.2002, *Fischer;* Karamba, 13.9.2002, *Fischer;* Kamiranzovu, 5.4.2002, *Fischer;* Mt Bigugu, 6.4.2002, *Fischer*.

Pseudocyphellaria crocata (L.) Vain.
Cosmopolitan. – NYUNGWE FOREST: Rwasenkoko, 5.4.2002, *Fischer.*

Pseudocyphellaria clathrata (de Not.) Malme
South America, in E Africa known from Uganda, Kenya and Tanzania. – CENTRAL PLATEAU: Butare, campus of National University, 3.2002, *Fischer.*

Pseudocyphellaria intricata (Delise) Vain.
Widespread in the tropics and extending into temperate regions. – NYUNGWE FOREST: Kamiranzovu, on *Hagenia abyssinica*, 18.3.2003, *Killmann & Fischer*.

Punctelia rudecta (Ach.) Krog
Widespread in tropical and temperate regions. – NYUNGWE FOREST: Kitabi, on rocks, 28.3.2003, *Killmann & Fischer*.

Ramalina africana (B. Stein) Dodge
Widespread in E Africa from Ethiopia to Tanzania. – GISHWATI FOREST: Vallée de la Sebeya, 3 km au sud du poste minier de Gikungu, 29.7.1974, *Lambinon 74/624* (LG). – CENTRAL PLATEAU: Butare, garden of IRST, 12.10.2000, *Fischer & Kunsmann;* Butare, Parc de l'INRS, 21.7.1974, *Lambinon 74/422* (LG); Butare, experimental field PASI, 19.10.2000, *Fischer & Kunsmann;* Ntyazo, route de Kiberizi, 10.4.1980, *Lambinon 80/320* (LG); Gakoma, sud de la commune de Muyaga, 9.4.1980, *Lambinon 80/225* (LG); ibid., 9.4.1980, *Lambinon 80/242* (LG). – AKAGERA REGION: Parc National de l'Akagera, sud du massif de Muhoruro, 12.1.1972, *Lambinon 72/Rw/163b* (LG); Gabiro, 11.1.1972, *Lambinon 72/Rw/127* (LG).

Ramalina hoehneliana Müll. Arg.
E Africa from Ethiopia to Tanzania. Troupin (in sched.) has recorded the Kinyarwanda name Ishirankima for the species. – GISHWATI FOREST: Gishwati, km 30 route Gisenyi - Kibuye,

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6.2.1972, *Lambinon 72/Rw/477* (LG). – Akagera Region: Kagitumba, 20.5.1955, *Christiaensen 876a* (LG); Umutara, Nyagatare, on *Haplocoelum gallaense,* 8.10.1999, *Fischer;* Bugesera, 6.9.1958, *Troupin 8386a* (LG); Bugesera, colline de Kanzenza, 13.3.1972, *Lambinon 72/Rw/ 1100* (LG). – Central Plateau: Kamonyi, Rugobagoba, on *Eucalyptus calmaldulensis,* 17.3.2003, *Killmann & Fischer;* ISAR Songa, on *Eucalyptus* sp., 3.2002, *Fischer.*

Ramalina reducta Krog & Swinscow
Australia, E and S Africa. – Nyungwe Forest: W Kitabi, on *Macaranga neomildbraediana,* 20.10. 2000, *Fischer & Kunsmann;* Rwasenkoko, on *Erica rugegensis,* 17.3.2003, *Killmann & Fischer.*

Ramalina roesleri (Schaerer) Hue
Widespread in the northern hemisphere; in Africa previously known only from a single locality in Tanzania. – Nyungwe Forest: Gisakura, 5.4.2002, *Fischer;* Kamiranzovu, on *Hagenia abyssinica,* 18.3. 2003, *Killmann & Fischer.*

Rimelia clavulifera (Räsänen) Kurok.
Previously known only from Asia (Thailand, Japan, Taiwan, Fiji Islands), but usually not recognized at species level and may be present among collections of other *Rimelia* species from Africa. – Nyungwe Forest: Rwasenkoko, 15.10.1999, *Fischer* (det. J. A. Elix).

Rimelia reticulata (Tayl.) Hale & A. Fletcher
Widespread in tropical and temperate regions. – Central Plateau: Butare, Park of the IRST, 14.10.1999, *Fischer* (det. J. A. Elix); Vallée de Gatobwe, near border of Burundi, 24.3.2002, *Fischer* (det. J. A. Elix).

Solorina simensis Flotow
Asia, Africa; in E Africa previously known from Ethiopia, Kenya and Congo. – Virunga Volcanoes: Mt Bisoke, 9.1988, *Fischer.*

Sticta fuliginosa (Hoffm.) Ach.
Widespread in tropical and temperate regions. – Virunga Volcanoes: Birunga, pied sud de Gahinga, 14.2.1972, *Lambinon 72/Rw/664* (LG). – Gishwati Forest: Gishwati, km 40 route Gisenyi to Kibuye, 6.2.1972, *Lambinon 72/Rw/526* (LG). – Nyungwe Forest: Kamiranzovu, 5.4.2002, *Fischer.* – Central Plateau: Butare, Arboretum Ruhande, 16.1.1972, *Lambinon 72/Rw/205* (LG).

Sticta limbata (Sm.) Ach.
Widespread in tropical montane and temperate regions. – Virunga Volcanoes: Mt Bisoke, on *Dendrosenecio adnivalis,* 19.9. 2002, *Fischer.*

Sticta weigelii (Ach.) Vain.
Widespread in tropical and temperate regions. – Virunga Volcanoes: Kirimbi, foot of Mt Gahinga, on *Embelia* sp., 22.3.2003, *Killmann & Fischer.* – Nyungwe Forest: Mt Bigugu, 6.4. 2002, *Fischer;* Kamiranzovu, 5.4.2002, *Fischer;* Rwasenkoko, on *Erica rugegensis,* 17.3. 2003, *Killmann & Fischer.*

Teloschistes flavicans (Sw.) Norman
Widespread in tropical and warm temperate regions. – Gishwati Forest: Gishwati, km 40 route Gisenyi to Kibuye, 6.2.1972, *Lambinon 72/Rw/524* (LG). – Nyungwe Forest: W Kitabi, on *Macaranga neomildbraediana,* 20.10.2000, *Fischer & Kunsmann;* Rwasenkoko, on *Cliffortia nitidula,* 14.10.2000, *Fischer & Kunsmann;* Gisakura, on solitary *Strombosia scheffleri,* 15.10. 2000, *Fischer & Kunsmann;* forèt de Rugege (= Nyungwe), km 5 de la piste Pindura to Bweyeye, 16.8. *1974, Lambinon 74/895* (LG). – Central Plateau: Commune de Rugera, vallée Uwagahunga, sud-ouest de la Préf. de Gikongoro, 6.9.1974, *Lambinon 74/1144* (LG). – Akagera Region: Parc

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National de l'Akagera, rive sud-ouest du Lac Ihema, 13.1.1972, *Lambinon 72/Rw/187* (LG); ibid., 13.1.1972, *Lambinon 72/Rw/188* (LG).

Teloschistes hypoglaucus (Nyl.) Zahlbr.
Tropical America; in Africa known from Ethiopia, Kenya and Tanzania. – VIRUNGA VOLCANOES: Mt Bisoke, near National Park border, on *Crassocephalum mannii,* 23.3.2003, *Killmann & Fischer*.

Xanthoparmelia subramigera (Gyeln.) Hale
Widespread in E and S Africa, the Canary Islands and the Americas. – AKAGERA REGION: Kibungo, Nyarubuye, quartzitic rocks, 9.10.1999, *Fischer* (det. J. A. Elix).

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