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NEW RECORDS OF LICHEN-FORMING FUNGI FROM KENYA

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ABSTRACT

Diversity of tropical lichen-forming fungi, especially crustose lichens is currently poorly known. Since lichens are important bioindicators of air pollution, forest health, and climate change, we addressed the lichen diversity in Kenya. Our study focused on the diversity of lichen-forming fungi in the Mount Kenya montane forests, where we sampled corticolous lichens at ten localities in the Mount Kenya forest. The lichen diversity in the study area was very rich with fifty-nine species recorded for the first time from Kenya; 18 of them are new records for the African continent. Diagnostic features and distribution areas are given for each species reported. The crustose genera *Auriculora, Candelariella, Clandestinotrema, Diorygma, Hemithecium, Lecanactis, Lepraria, Letrouitia, Megalospora, Mycoporum, Ocellularia, Placynthiella, Piccolia, Ramboldia, Tephromela* and *Thelotrema* are reported here from Kenya for the first time. The majority of new records belong to pan- or palaeotropical species, in addition to cosmopolitan elements.

Keywords: African lichens; Ascomycota; lichens; new records; Mount Kenya

INTRODUCTION

Kenya represents a major part of East Africa with diverse terrestrial tropical ecosystems, from mangrove and coastal forests to alpine vegetation at high elevations. Given the large diversity of ecosystems, one would expect a large number of species of lichenised fungi to occur in the area. However, the current preliminary checklists of lichens and lichenicolous fungi of Kenya includes only 594 species while the country is estimated to have at least 1400 species (Feuerer, 2011). This demonstrates that the lichen flora of East Africa and especially Kenya is currently poorly known. Lichenological exploration in Kenya started in the early 20th century with European explorers and later by some professional botanists visiting the country and collecting lichens among plants. Results from those collections were published in several papers (*e.g.* Hue, 1916; Cengia Sambo, 1938; Maas Geesteranus, 1955) and summarized in treatments of tropical lichens from Africa by Dodge (1953, 1956, 1957, 1959, 1964, 1971). The latter series of publications, however, suffered from the author's narrow

species concept. In the 1970s, the Norwegian Hildur Krog and the British Dougal Swinscow collected intensively in East Africa between 1971 and 1977. Their collections and subsequent excursions by other lichenologists dramatically increased the knowledge of the Kenyan lichen flora, especially for foliose and fruticose lichens (*e.g.* Krog & Swinscow, 1974, 1975a, 1975b, 1976, 1977, 1979, 1981; Swinscow & Krog, 1981; Krog & Swinscow, 1986, 1987; Ahti *et al.*, 1987; Almborn, 1989; Elix, 2002; Lücking & Kalb, 2002; Jørgensen, 2003; Kalb, 2004; Frisch *et al.*, 2006; Kalb, 2007, 2008; Frisch & Tibell, 2010). Swinscow and Krog's contributions to the knowledge of the lichen flora of East Africa culminated in the publication of the 'Macrolichen flora of East Africa' in 1988. Our recent work in Kenya, however, indicated that the lichen flora remains poorly known and our present survey of the Mount Kenya area confirmed this hypothesis.

MATERIALS AND METHODS

During a joint excursion in 2010 and subsequent intense field work by the first author during a study of the altitudinal zonation of lichenised fungi in Mount Kenya National Park, we collected lichens in the highlands of Mount Kenya. While material on the joint field trip was collected randomly in the Mount Kenya area, subsequent collecting was done at ten study sites at different altitudes (table 1). The samples were collected with knives and wood chisels as standard in lichenology and vouchers are deposited in the East African herbarium (EA) at the National Museums of Kenya with duplicates at the Field Museum (F) in Chicago (USA). Specimens were identified using specific literature as cited below under each species and compared with herbarium material in F.

Table 1. The study sites in the Mount Kenya area.

Study site	Route	Altitude	Vegetation
1	Chogoria	1827 m	Mixed montane forest dominated by *Podocarpus, Neoboutonia, Strombosia, Harungana.*
2	Chogoria	2018 m	Mixed montane forest dominated by *Strombosia, Lasianthus, Tabernaemontana, Syzygium, Podocarpus, Neoboutonia, Ocotea.*
3	Chogoria	2232 m	Mixed montane forest dominated by *Macaranga, Neoboutonia, Xymalos, Psychotria, Podocarpus.*
4	Chogoria	2475 m	Mixed forest with closed canopy dominated by *Podocarpus, Afrocrania, Lepidotrichilia, Cassipourea, Psychotria.*
5	Chogoria	2687 m	Bamboo dominated forest with scattered *Podocarpus.*
6	Chogoria	3043 m	Patches of open forest dominated by *Hagenia, Hypericum, Juniperus.*
7	Sirimon	2465 m	Disturbed dry forest upland with *Juniperus, Dodonaea, Faurea, Rhus, Rhamnus.*
8	Sirimon	2660 m	Mixed forest with *Juniperus, Podocarpus, Agarista, Faurea.*
9	Sirimon	2870 m	Montane forest with *Podocarpus, Juniperus, Olea, Hypericum, Arundinaria.*
10	Sirimon	3080 m	Open patches of grassland intermixed with open forest dominated by *Juniperus, Podocarpus, Hagenia, Arundinaria.*

RESULTS AND DISCUSSION

A total of 245 taxa were identified from 1007 lichen specimens collected during the study. These belonged to 73 genera and 40 families following current classification (Lumbsch & Huhndorf, 2010). A more detailed study and ecological analyses with a complete list of specimens will be published elsewhere. Here we report 59 new records for Kenya, which brings the number of lichen species known from Kenya to 653. Eighteen of these new records represent new records for the entire African continent. This contribution adds the following 16 genera to the lichen flora of Kenya: *Auriculora, Candelariella, Clandestinotrema, Diorygma, Hemithecium, Lecanactis, Lepraria, Letrouitia, Megalospora, Mycoporum, Ocellularia, Placynthiella, Piccolia, Ramboldia, Tephromela* and *Thelotrema.* All newly recorded genera have a crustose growth form.

NEW RECORDS

Agonimia pacifica (H.Harada) Diederich, in Aptroot *et al.*, *Bibl. Lichenol.* 64: 12 (1997)
Illustration: Figure 1A.
Distribution: Pantropical (Harada, 1993; Aptroot *et al.*, 1997; Aptroot, 2002), here reported from Africa for the first time.
Notes: This species is characterized by a small squamulose thallus with few or no papillae. The light green to brownish green squamules are loosely attached to the substratum, with central parts being almost crustose and tightly attached to the substrate. The lobes are branched to dissected and below 0.05 mm wide. The African material was sterile, for a description of ascomatal characters see elsewhere (Harada, 1993; Aptroot *et al.*, 1997; Aptroot, 2002).
Specimens examined: Kenya: Eastern Prov., Chogoria route, 1.5 km from Kenya Forest Service (KFS) station towards the Kenya Wildlife Service (KWS) park gate, 1827 m, 00˚14´S, 37˚34´E, 30.09.2010, *Kirika et al. 1236* (EA, F); Along Chogoria route towards KWS Park gate, 2232 m, 00˚13S, 37˚31'E, 2.10.2010, *Kirika et al. 1498* (EA).

Arthonia complanata Fée, *Essai Crypt. Exot.* (Paris) 1: 54 (1825)
Distribution: Pantropical.
Notes: This is a widespread pantropical species characterized by the white-grey thallus and flat, black ascomata with rounded to irregular outline. The ascospores are 5-septate with enlarged upper cell and about 25 × 8 μm large. The genus *Arthonia* is in urgent need of revision and *Arthonia complanata* is probably a complex of several species.
Specimens examined: Kenya: Eastern Prov., Sirimon route, *ca.* 3 km from KWS park gate towards the Old Moses Camp., 2870 m, 00˚00'S, 37˚15'E, 8.10.2010, *Kirika et al. 2096* (EA, F).

Auriculora byssomorpha (Nyl.) Kalb, *Lich. Neotrop.* 10: 2 (1988)
Distribution: Pantropical, previously recorded in East Africa from Tanzania (Vězda, 1989).
Notes: This species is remarkable in having apothecia with ear-like appendages at the apothecial margins that make this tropical crust easy to recognize. These appendages are products of a unique type of hymenium development in the species. In the apothecia new hymenia are repeatedly formed, each beneath the next older disintegrating hymenium

(Henssen & Titze, 1990). Often portions of the disintegrating hymenium remain stuck to the apothecia to form the characteristic ear-like appendages.
Specimens examined: Kenya: Central Prov., Aberdare National Park, Chania Falls, 0˚24'N, 36˚44'E, 24.01.2010, *Kirika et al.* 1045 (EA, F).

Caloplaca brebissonii (Fée) J.Sant.ex Hafellner & Poelt, *J. Hattori Bot. Lab.* 46: 18 (1979)
Illustration: Figure 1B.
Distribution: Pantropical (Hafellner & Poelt, 1979), previously recorded from the Neotropics, Hawaii, and India (Hafellner & Poelt, 1979; Awasthi, 1991). New to Africa.
Notes: This *Caloplaca* species is characterized by a whitish grey thallus and orange to red-brown apothecia, ascospores with 3 loculi with a large central loculus and measuring up to 35μm in length.
Specimens examined: Kenya: Eastern Prov., Sirimon route, 2870 m, *ca.* 3 km from KWS gate towards Old Moses Camp, 00˚00'S 37˚15'E, 7.10.2010, *Kirika et al. 2052* (EA); Towards Old Moses Camp, 3080 m, 00˚01'S, 37˚16'E, 8.10.2010, *Kirika et al. 2174* (EA, F).

Candelariella vitellina (Ehrh.) Müll.Arg., *Bull. Herb. Boissier* 2 (app. 1): 47 (1894)
Distribution: Cosmopolitan.
Notes: This widely distributed species is readily distinguished by the crustose, non-sorediate, yellowish to orange thallus and the multispored asci.
Specimens examined: Kenya: Central Prov., Sirimon Track, Old Moses Camp, 3400 m, 0˚03'N, 37˚17'E, 26.01.2010, *Kirika et al. 1114* (EA, F).

Clandestinotrema clandestinum (Ach.) Rivas Plata, Lücking & Lumbsch, *Fungal Diversity* **52**(1): 118 (2012)
Distribution: Pantropical, previously recorded from Tanzania (Frisch *et al.*, 2006).
Notes: This species is characterized by ascospores with diamond-shaped lumina, the presence of a apically carbonized columella and the stictic acid chemosyndrome (Rivas-Plata *et al.*, 2011).
Specimens examined: Kenya: Eastern Prov., Chogoria route, 1.5 km from KFS station towards the KWS park gate, 1827 m, 00˚14´S 37˚34´E, 30.09.2010, *Kirika et al. 1241B* (F).

Coenogonium kalbii Aptroot, Lücking & Umaña, in Rivas Plata *et al.*, *Fung. Diversity* 23: 281 (2006)
Illustration: Figure 1C.
Distribution: Pantropical, previously recorded from the Neotropics (Rivas Plata *et al.*, 2006). New to the Paleotropics.
Notes: *Coenogonium kalbii* was recently described from Costa Rica. This species belongs to the *C. geralense* group comprising a number of similar species with medium-sized to large apothecia, small, narrowly ellipsoid ascospores, and small conidia. Within the group, *C. kalbii* can be distinguished by pale orange discs and conidia that are up to 4 μm long.
Specimens examined: Kenya: Eastern Prov., Chogoria route, towards KWS park gate, 2475 m, 00˚11'S, 37˚29'E, 4.10.2010, *Kirika et al. 1640* (EA, F); Sirimon route, 1 km from KWS park gate towards the Old Moses Camp, 2660 m, 00˚00'N, 37˚15'E, 6.10.2010, *Kirika et al. 1973* (EA).

Coenogonium luteum (Dicks.) Kalb & Lücking, in Lücking & Kalb, *Bot. Jb.*122: 32 (2000)

Illustration: Figure 1D.
Distribution: Cosmopolitan (Rivas Plata *et al.*, 2006). The species is common in temperate and subtropical areas of the northern Hemisphere, but also extends into the tropics.
Notes: A number of different species have previously been included under the collective name *Coenogonium luteum. Coenogonium luteum s.s.* is characterised by having large apothecia with orange discs, an exciple consisting of small, thick-walled cells, broadly ellipsoid ascospores, and small conidia (Rivas Plata *et al.*, 2006). Also, the thallus is usually grey rather than green, and the species typically grows on bryophytes and bark at high elevations.
Specimens examined: Kenya: Eastern Prov., Sirimon route, 1 km from KWS park gate towards the Old Moses Camp, 2660 m, 00˚00'S, 37˚15'E, 6.10.2010 *Kirika et al. 1952* (EA);*ca.* 3 km from KWS gate towards Old Moses Camp, 2870 m, 00˚00'S, 37˚15'E, 7.10.2010, *P.Kirika et al. 2042, 2044*, *2046, 2066* (EA, F).

Coenogonium nepalense (G.Thor & Vězda) Lücking, Aptroot & Sipman, in Rivas Plata *et al.*, *Fung. Diversity* 23: 297 (2006)
Distribution: Pantropical (Rivas Plata *et al.*, 2006).
Notes: Among the crustose *Coenogonium* spp. this species is readily distinguished by having short, narrowly ellipsoid ascospores and medium-sized, pale yellow apothecia (Rivas Plata *et al.*, 2006).
Specimens examined: Eastern Prov., Chogoria route, towards KWS Park gate, 2687 m, 00˚10'S, 37˚27'E, 4.10.2010, *Kirika et al. 1737* (EA, F).

Coenogonium stenosporum (Malme) Lücking, Aptroot & Sipman, in Rivas Plata, *et al.*, *Fung. Diversity* 23: 298 (2006)
Distribution: Pantropical, previously known from the Neotropics (Rivas Plata *et al.*, 2006); new to the Paleotropics.
Notes: This *Coenogonium* species has a crustose thallus without a visible prothallus, medium sized apothecia (0.3–0.8 mm in diam.), and narrow ascospores (8–12 x 1.5–2.0 μm) (Rivas Plata *et al.*, 2006).
Specimens examined: Kenya: Eastern Prov., Sirimon route, Towards KWS Sirimon park gate, 2465 m, 00˚01'N, 37˚14'E, 6.10.2010, *Kirika et al. 1903* (EA).

Diorygma minisporum Kalb, Staiger & Elix, in Kalb *et al.*, *Symb. Bot. Upsal.* 34(1): 161 (2004)
Illustration: Figure 1E.
Distribution: Pantropical, the species was previously known from the Neotropics (Kalb *et al.*, 2004); new to the Paleotropics.
Notes: *Diorygma minisporum* is characterized by having small, transversely septate ascospores and contains the hypostictic acid chemosyndrome (Kalb *et al.*, 2004).
Specimens examined: Kenya: Eastern Prov., Chogoria route, towards KWS Park gate, 2232 m, 00˚13'S, 37˚31'E, 5.10.2010, *Kirika et al. 1551* (EA, F), *1553* (EA).

Eschatogonia triptophyllina (Nyl.) Kalb, *Bibl. Lichenol.* 88: 310 (2004)
Illustration: Figure 1F.
Distribution: Pantropical – this species is here recorded from the Paleotropics for the first time. Previously known from the Neotropics (Swinscow & Krog, 1981; Kalb, 2004).
Notes: This species belongs to the small genus *Eschatagonia,* which can be distinguished from the similar genus *Phyllopsora* by the presence of a cortex composed of a single layer of

rounded or cuboid cells with thick cell walls (Brako, 1991; Timdal, 2008). Within the genus, the species is readily distinguished by narrow, flattened lobes, which are short, richly branched and becoming ascending, and the absence of secondary metabolites (Timdal, 2008).
Specimens examined: Kenya: Eastern Prov., Chogoria route, 5 km from the edge of forest towards KWS park gate, 2018 m, 00˚14'S, 37˚32'E, 1.10.2010, *Kirika et al. 1389* (EA, F).

Fissurina triticea (Nyl.) Staiger, *Bibl. Lichenol.* 85: 156 (2002)
Distribution: Pantropical (Staiger, 2002), previously known from Macaronesia and Réunion.
Notes: This *Fissurina* species is characterized by having ascomata of the "subcontexta-type" (Staiger, 2002), well-developed, non-carbonized exciple, and 4-septate, thick-walled, hyaline ascospores.
Specimens examined: Kenya: Eastern Prov., Chogoria route, 1.5 km from KFS station towards the KWS park gate, 1827 m, 00˚14´S, 37˚34´E, 30.09.2010, *Kirika et al. 1233B* (EA), *1238* (EA, F).

Graphis consanguinea (Müll.Arg.) Lücking, in Lücking *et al.*, *Fieldiana, Bot.* 46: 67 (2008)
Distribution: Pantropical, previously known from the Neotropics (Staiger, 2002; Lücking *et al.*, 2008a).
Notes: This species is characterized by having immersed-erumpent lirellae with a complete thalline cover, a completely carbonized exciple that becomes striate, 1-spored asci, muriform, amyloid ascospores, and by the absence of secondary metabolites (Staiger, 2002; Lücking *et al.*, 2008a; Lucking *et al.*, 2009).
Specimens examined: Kenya: Eastern Prov., Chogoria route, towards KWS Park gate, 2475 m, 00˚11'S, 37˚29'E, 4.10.2010, *Kirika et al. 1652* (EA, F).

Graphis illinata Eschw., in von Martius, *Fl. Bras.* 1(1): 82 (1833)
Illustration: Figure 2A.
Distribution: Pantropical, previously known from the Neotropics (Wirth & Hale, 1978; Lücking *et al.*, 2008a). Records from the Cocos Islands (Elix & McCarthy, 1998) were found to be erroneous (Lücking *et al.*, 2008a).
Notes: *Graphis illinata* has prominent, elongate lirellae, with a completely carbonized exciple, 1-spored asci, muriform, amyloid ascospores, and lacks secondary metabolites. It is similar to *G. mexicana* in anatomy but the latter differs in having round, perithecioid ascomata (Lücking *et al.*, 2008a; Mangold *et al.*, 2008).
Specimens examined: Kenya: Eastern Prov., Chogoria route, 1.5 km from KFS forest station towards the KWS park gate, 1827 m, 00˚14´S, 37˚34´E, 30.09.2010, *Kirika et al. 1261* (EA); Chogoria route, 5 km from the edge of forest towards KWS park gate, 2018 m, 00˚14'S, 37˚32'E, 1.10.2010, *Kirika et al. 1429, 1452*, *1492,* (EA); Along Chogoria route towards KWS park gate, 2232 m, 00˚13'S, 37˚31'E, 2.10.2010, *Kirika et al., 1507* (EA), *1514* (EA); Along Chogoria route towards KWS park gate, 2232 m, 00˚13 S, 37˚31'E, 5.10.2010, *Kirika et al. 1560, 1563* (EA); Chogoria route, towards KWS park gate, 2475 m, 00˚11'S, 37˚29'E, 4.10.2010, *Kirika et al. 1653* (EA, F).

Graphis proserpens Vain., *Bot. Tidsskr.* 29: 132 (1909)
Illustration: Figure 2B.
Distribution: Pantropical, previously recorded from the Neotropics, India, and Réunion (Staiger, 2002; Lücking *et al.*, 2008a); new to East Africa.

Notes: This species has erumpent and richly branched lirellae, an apically carbonized exciple, 8-spored asci, amyloid, parallel septate ascospores with 7–12 loculi, and lacks secondary metabolites (Staiger, 2002; Lücking *et al.*, 2008a).
Specimens examined: Kenya: Eastern Prov., Chogoria route, 1.5 km from KFS forest station towards the KWS park gate, 1827 m, 00˚14´S, 37˚34´E, 30.09.2010, *Kirika et al.1322* (EA, F); 5 km from the edge of forest towards KWS park gate, 2018 m, 00˚14'S, 37˚32'E, 1.10.2010, *Kirika et al. 1397* (EA, F); Along Chogoria route towards KWS park gate, 2232 m, 00˚13'S, 37˚31'E, 5.10.2010, *Kirika et al. 1603* (EA), *1609* (EA, F); Along Chogoria route towards KWS park gate, 2475 m, 00˚11'S, 37˚29'E, 4.10.2010, *Kirika et al. 1666* (EA, F), *1715* (EA).

Graphis streblocarpa (Bél.) Nyl., *Flora,* Jena 49: 133 (1866)
Illustration: Figure 2C.
Distribution: Paleotropical, previously recorded from Australia, Asia, the Pacific, and Tanzania (Archer, 2006).
Notes: This species is characterized by having lirellae with conspicuous thalline margins, a laterally carbonized exciple, 8-spored asci, muriform ascospores, and by the presence of the stictic acid chemosyndrome (Archer, 2006).
Specimens examined: Kenya: Eastern Prov., Chogoria route, 5 km from the edge of forest towards KWS park gate, 2018 m, 00˚14'S, 37˚32'E, 1.10.2010, *Kirika et al. 1460* (EA, F): Along Chogoria route towards KWS Park gate, 2232 m, 00˚13'S, 37˚31'E, 2.10.2010, *Kirika et al. 1499*, *1540* (EA).

Haematomma collatum (Stirt.) C.W.Dodge, *Beih. Nova Hedwigia* 38: 41 (1971)
Distribution: Pantropical, previously recorded from Tanzania (Staiger & Kalb, 1995).
Notes: *Haematomma collatum* has sessile apothecia with often crenulate thalline margins, 10-16-celled ascospores, and contains atranorin, the sphaeorophorin chemosyndrome, and the pigment russulone (Staiger & Kalb, 1995).
Specimens examined: Kenya: Eastern Prov., Chogoria route, 1.5 km from KFS station towards the KWS park gate, 1827 m, 00˚14´S, 37˚34´E, 30.09.2010, *Kirika et al. 1222* (EA).

Hemithecium chlorocarpum (Fée) Trevis., *Spighe e Paglie* 1: 13 (1853)
Illustration: Figure 2D.
Distribution: Pantropical, previously known from the Neotropics (Staiger, 2002).
Notes: This taxon is readily distinguished from other *Hemithecium* spp. by its 1-spored asci, the amyloid, richly muriform, hyaline to slightly brownish ascospores, and the absence of secondary metabolites (Staiger, 2002).
Specimens examined: Kenya: Eastern Prov., Chogoria route, 5 km from the edge of forest towards KWS park gate, 2018 m, 00˚14'S, 37˚32'E, 1.10.2010, *Kirika et al. 1440* (EA, F).

Heterodermia allardii (Kurok.) Trass, *Folia Cryptog. Eston.* 29: 6 (1992)
Illustration: Figure 2E.
Distribution: Pantropical, previously known from the Neotropics (Kurokawa, 1962).
Notes: This species is characterized within the *H. podocarpa* group by having eciliate lobes and apothecia, capitate soralia, and the presence of the norsticitic acid chemosyndrome in addition to atranorin (Kurokawa, 1962).
Specimens examined: Kenya: Eastern Prov., Chogoria route, *ca.* 3 km from KWS Chogoria Park gate towards end road, 3043 m, 00˚09'S, 37˚25'E, 4.10.2010, *Kirika et al. 1805* (EA, F); Sirimon route, *ca.* 3 km from KWS gate towards Old Moses Camp, 2870 m, 00˚00'S, 37˚15'E,8.10.2010, *Kirika et al. 2105* (EA, F).

Heterodermia casarettiana (A.Massal.) Trev., *Atti Soc. Ital. Sci. Nat.* 11: 624 (1868)
Distribution: Pantropical, previously known from the Neotropics (Kurokawa, 1962).
Notes: This species has appressed, sorediate lobes and contains the norstictic acid cheomsyndrome and salazinic acid, in addition to the pigments hybocarpone and norhybocarpone (Kurokawa, 1962; Lücking *et al.*, 2008b; Elix, 2010).
Specimens examined: Kenya: Eastern Prov., Chogoria route, towards KWS park gate, 2475 m, 00˚11'S, 37˚29'E, 4.10.2010, *Kirika et al. 1644* (EA, F); *ca.* 3 km from KWS Chogoria park gate towards end road, 3043 m, 00˚09'S, 37˚25'E, 4.10.2010, *Kirika et al. 1774* (EA, F), *1852* (EA); Sirimon route, towards KWS Sirimon park gate, 2465 m, 00˚01'N, 37˚14'E, 6.10.2010, *Kirika et al. 1889, 1923*, *1924* (EA).

Lecanactis platygraphoides (Müll.Arg.) Zahlbr., *Cat. Lich. Univ.* 2: 541 (1923)
Illustration: Figure 2F.
Distribution: Paleotropical, previously known from Australasia (Egea & Torrente, 1994).
Notes: This taxon features an exciple consisting of hyphae with slightly gelatinized walls, 3-septate ascospores 25–40 μm long, microconidia, 6–8 μm long, and the presence of schizopeltic acid (Egea & Torrente, 1994).
Specimens examined: Kenya: Eastern Prov., Chogoria route, towards KWS Park gate, 2475 m, 00˚11'S, 37˚29'E, 4.10.2010, *Kirika et al. 1691, 1693* (EA, F).

Lecanora bicincta Ramond, *Annls Sci. Nat.*, Bot., sér. 4, 6: 132 (1827)
Distribution: Cosmopolitan, a so called bipolar species that occurs at high altitudes in tropical regions and is widely distributed in temperate and arctic regions of both hemispheres (Lumbsch & Elix, 2004).
Notes: This species is readily distinguished by the bluish grey-pruinose discs surrounded by a well-developed parathecial ring, and whitish to yellowish grey thallus, and the presence of sordidone in the discs (reacting C+ orange) and the thiophanic acid chemosyndrome in the thallus (Leuckert & Poelt, 1989; Lumbsch & Elix, 2004).
Specimens examined: Kenya: Central Prov., Sirimon Track, Old Moses Camp, 3400 m alt., 0˚03'N, 37˚17'E, 26.01.2010, *Kirika et al. 1131* (EA).

Lecanora caesiorubella Ach., *Lich. Univ.*: 366 (1810)
Distribution: Pan(sub-)tropical (Lumbsch *et al.*, 1997; Lumbsch & Elix, 2004).
Notes: This species is easily identified by its large, heavily pruinose lecanorine apothecia, the absence of an amphithecial cortex and the presence of small crystals in the amphithecium and pseudocortex (Lumbsch *et al.*, 1997).
Specimens examined: Kenya: Central Prov., Naro Moru Route, E of Metereological Station, 3080 m alt., 0˚11'N, 37˚14'E, 25.01.2010, *Kirika et al. 1073* (EA); Bantu Lodge at NW entrance of park, 1960 m alt., 0˚07'S, 37˚03'E, 25.01.2010, *P. Kirika et al. 1099* (EA, F); Sirimon Track, Old Moses Camp, 3400 m alt., 0˚03'N, 37˚17'E, 26.01.2010, *Kirika et al. 1120* (EA, F); Chogoria Track, close to Chogoria Gate, 2960 m alt., 0˚09'S, 37˚26'E, 27.01.2010, *Kirika et al. 1182* (EA).

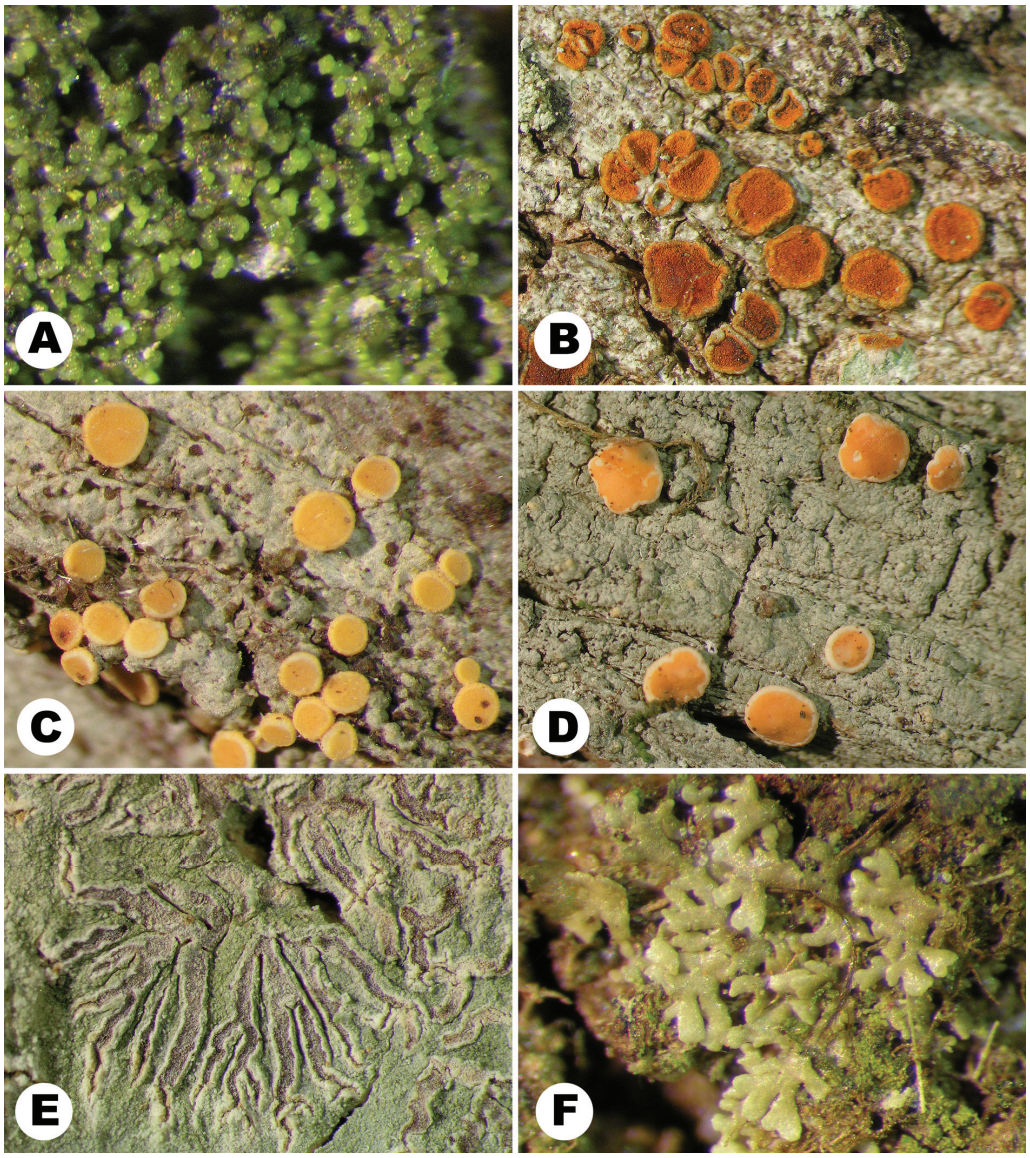

Figure 1. A. Agonimia pacifica, *Kirika 1236 (EA). B.* Caloplaca brebissonii, *Kirika 2174 (EA). C.* Coenogonium kalbii, *Kirika 1640 (EA). D.* C. luteum, *Kirika 2042 (EA). E.* Diorygma minisporum, *Kirika 1551 (EA). F.* Eschatogonia triptophylla *Kirika 1389 (EA).*

Lecanora helva Stizenb., *Ber. Thät. St Gall. Naturw. Ges.*: 218 (1890)
Distribution: Pantropical (Lumbsch, 1994; Guderley, 1999).
Notes: *Lecanora helva* is one of a group of closely related tropical species with small, orange-brown apothecia, a granulose epihymenium, large crystals in the amphithecium, and small ascospores. Similar species include *L. achroa* Nyl. and *L. leprosa* Fée. *Lecanora helva* is mainly distinguished from these species in containing the 2'-*O*-methylperlatolic acid chemosyndrome (Lumbsch & Elix, 1993).
Specimens examined: Kenya: Central Prov., Bantu Lodge at NW entrance of park, 1960 m alt., 0˚07'S, 37˚03'E, 25.01.2010, *Kirika et al. 1095* (EA).

Lepraria coriensis (Hue) Sipman, *Herzogia* 17: 28 (2004)
Distribution: Paleotropical (Sipman, 2004; Saag *et al.*, 2009), new to Africa.
Notes: This is one of the species in *Lepraria* containing usnic acid but is unrelated to the core of the genus as shown by molecular data (Nelsen *et al.*, 2008). Another leprarioid lichen with usnic acid in the tropics is *L. usnica,* which has smaller lobes which lack a marginal rim (Sipman, 2003, 2004).
Specimens examined: Kenya: Eastern Prov., Sirimon route, towards KWS Sirimon gate park gate, 2465 m, 00˚01'N, 37˚14'E, 6.10.2010, *Kirika et. al., 1921, 1922, 1925* (EA); Sirimon route, 1 km from KWS park gate towards the Old Moses Camp, 2660 m, 00˚00'N, 37˚15'E, 6.10.2010, *Kirika et al. 1941, 1989, 1992* (EA).

Lepraria incana (L.) Ach., *Meth. Lich.*: 4 (1803)
Illustration: Figure 3A.
Distribution: Cosmopolitan (Elix, 2009b; Saag *et al.*, 2009).
Notes: A common and widespread leprose species containing the divaricatic acid chemosyndrome (Leuckert *et al.*, 1995; Saag *et al.*, 2009).
Specimens examined: Kenya: Eastern Prov., Chogoria route, 1.5 km from KFS forest station towards the KWS park gate, 1827 m, 00˚14´S, 37˚34´E, 30.09.2010, *Kirika et al.1202* (EA, F); Along Chogoria route towards KWS park gate, 2232 m, 00˚13´S, 37˚31'E, 2.10.2010, *Kirika et al.1542, 1631, 1637, 1677* (EA, F); Sirimon route, towards KWS Sirimon park gate, 2465 m, 00˚01'N, 37˚14'E, 6.10.2010, *Kirika et al. 1926* (EA, F).

Lepraria lobificans Nyl., *Flora* 56: 196 (1873)
Illustration: Figure 3B.
Distribution: Cosmopolitan (Elix, 2009b; Saag *et al.*, 2009).
Notes: *Lepraria lobificans*is a widespread and common crust with a whitish-grey, slightly lobate thallus and contains atranorin and the stictic acid chemosyndrome (Elix, 2009b; Saag *et al.*, 2009).
Specimens examined: Kenya: Eastern Prov., Chogoria route, towards KWS park gate, 2475 m, 00˚11'S, 37˚29'E, 4.10.2010, *Kirika et al.1635* (EA, F); Sirimon route, 1 km from KWS park gate towards the Old Moses Camp, 2660 m, 00˚00'S, 37˚15'E, 6.10.2010, *Kirika et al. 2019* (EA); *ca.* 3 km from KWS gate towards Old Moses Camp, 2870 m, 00˚00'S, 37˚15'E, 8.10.2010, *Kirika et al. 2136* (EA, F).

Lepraria usnica Sipman, *Bibl. Lichenol.* 86: 179 (2003)
Illustration: Figure 3C.
Distribution: Pantropical (Saag *et al.*, 2009).
Notes: This is another usnic acid containing species of *Lepraria* s. lat. – for a discussion on how to distinguish it from *L. coriensis* see above.

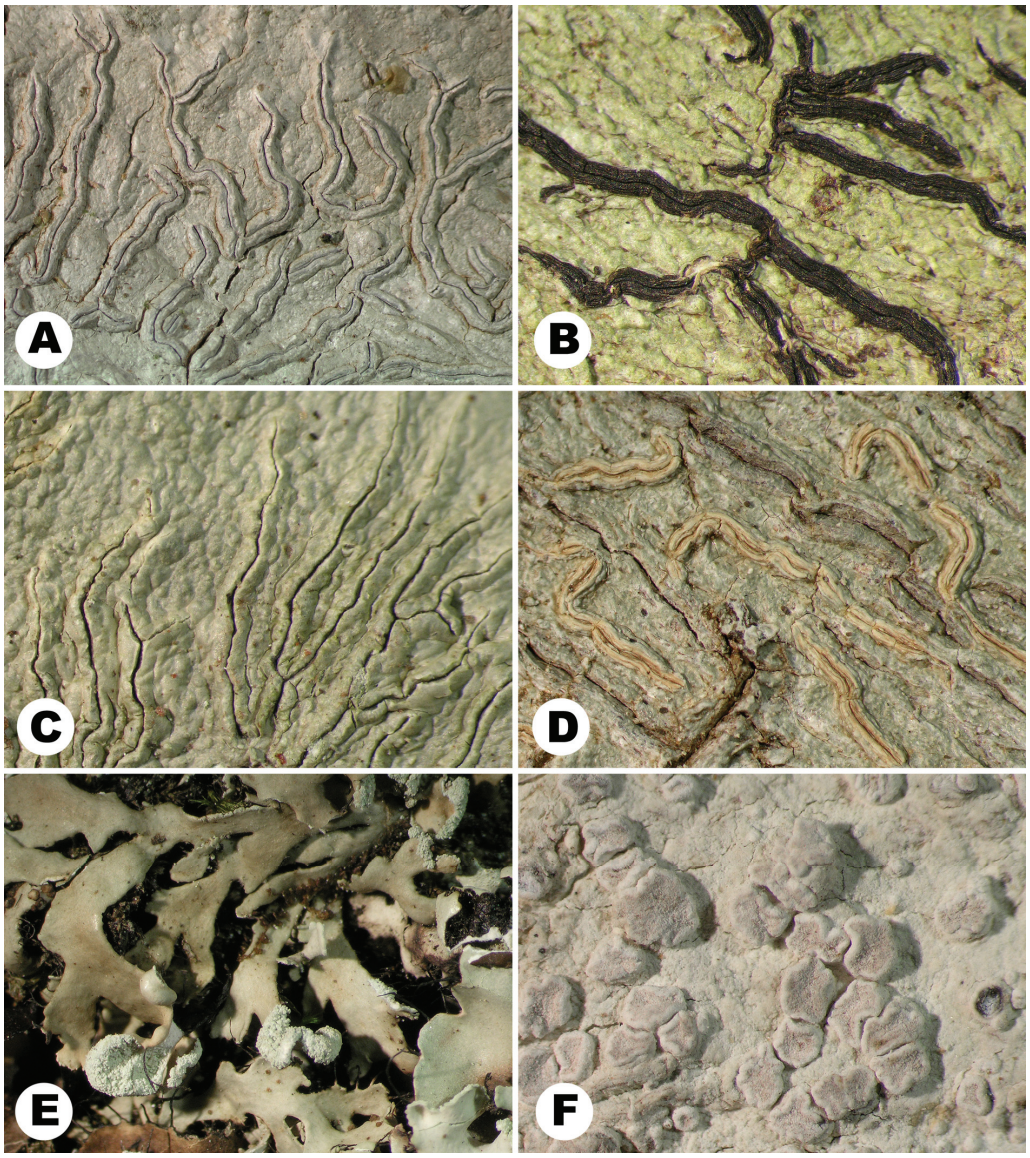

Figure 2. A. Graphis illinata, *Kirika 1653 (EA). B.* G. proserpens, *Kirika 1397 (EA). C.* G. streblocarpa, *Kirika 1460 (EA). D.* Hemithecium chlorocarpum, *Kirika 1440 (EA). E.* Heterodermia allardii, *Kirika 2105 (EA). F.* Lecanactis platygraphoides, *Kirika 1691 (EA).*

Specimens examined: Kenya: Eastern Prov., Chogoria route, towards KWS park gate, 2232 m, 00˚13´S, 37˚31'E, 5.10.2010, *Kirika et al. 1604* (EA), 2475 m, 00˚11'S, 37˚29'E, 4.10.2010, *Kirika et al. 1720* (EA, F); Sirimon route, *ca.* 3 km from KWS park gate towards Old Moses Camp, 2870 m, 00˚00'S, 37˚15'E, 8.10.2010, *Kirika et al. 2103* (EA), *2137,* (EA, F).

Letrouitia flavocrocea (Nyl.) Hafellner & Bellem., *Nova Hedwigia* 35: 281 (1982)
Illustration: Figure 3D.
Distribution: Pantropical (Hafellner, 1981; Elix, 2009a).
Notes: This esorediate species is characterized by having 8-spored asci with transversely septate ascospores, with 6–8 ovoid to lens-shaped locules, measuring 17–29 × 8–11 µm (Hafellner, 1981; Elix, 2009a).
Specimens examined: Kenya: Eastern Prov., Chogoria route, 1.5 km from KFS forest station towards the KWS park gate, 1827 m, 00˚14´S, 37˚34´E, 30.09.2010, *Kirika et al.1221* (EA, F), 5 km from the edge of forest towards KWS park gate, 2018 m, 00˚14´S, 37˚32'E, 1.10.2010, *Kirika et al. 1372* (EA), 1374 (EA, F); Sirimon route, *ca.* 3 km from KWS park gate towards Old Moses Camp, 2870 m, 00˚00'S, 37˚15'E, 7.10.2010, *Kirika et al. 2070* (EA, F).

Megalospora coccodes (Bél.) Sipman, *Bibl. Lichenol.* 18: 132 (1983)
Distribution: Pantropical, previously recorded from Tanzania in (Sipman, 1983).
Notes: This taxon has pale apothecial margins with small crystals, curved, 6–8-celled, transversely septate ascospores, and contains pannarin and zeorin in Sipman (1983).
Specimens examined: Kenya: Eastern Prov., Chogoria route, 1.5 km from forest station towards the KWS park gate, 1827 m, 00˚14´S, 37˚34´E, 30.09.2010, *Kirika et al. 1210, 1317* (EA, F), 5 km from the edge of forest towards KWS park gate, 2018 m, 00˚14´S, 37˚32'E, 1.10.2010, *Kirika et al. 1439, 1447, 1451* (EA); *ca.* 3 km from KWS Chogoria park gate towards end road, 3043 m, 00˚09'S, 37˚25'E, 4.10.2010, *Kirika et al. 1787* (EA).

Megalospora tuberculosa (Fée) Sipman, *Bibl. Lichenol.* 18: 156 (1983)
Distribution: Pantropical (Sipman, 1983; Sipman, 1986).
Notes: *Megalospora tuberculosa* is a widespread, pantropical species with straight, transversely septate ascospores, containing zeorin and pannarin or usnic acid (Sipman, 1986). Currently, the wide delimitation of the species has changed and morphologically or chemically differing local populations are regarded as distinct species (Harris, 1984, 1986; Untari, 2006; Lumbsch *et al.*, 2011a). The Kenyan specimens, however, belong to *M. tuberculosa s.s.*
Specimens examined: Kenya: Eastern Prov., Chogoria route, 5 km from the edge of forest towards KWS park gate, 2018 m, 00˚14 S, 37˚32'E, 1.10.2010, *Kirika et al. 1407* (EA, F), *1418* (EA); Along Chogoria route towards KWS park gate, 2232 m, 00˚13 S, 37˚31'E, 5.10.2010, *Kirika et al. 1583* (EA); 2475 m, 00˚11'S, 37˚29'E,4.10.2010, *Kirika et al. 1657* (EA).
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Mycoporum sparsellum Nyl., *Ann. Sci. Nat.*, Bot., sér. 5, 7: 343 (1867)
Illustration: Figure 3E.
Distribution: Pantropical (Aptroot *et al.*, 2008).
Notes: *Mycoporum sparsellum* has an ecorticate, whitish thallus with solitary perithecia having a gelatinizing hamathecium and 8-spored, pyriform asci. The ascospores are hyaline, 2-celled with a somewhat wider lower cell, smooth and clavate (Aptroot *et al.*, 2008).
Specimens examined: Kenya: Eastern Prov., Chogoria route, 1.5 km from KFS station towards the KWS park gate, 1827 m, 00˚14´S, 37˚34´E,30.09.2010, *Kirika et al. 1235* (EA, F).

Pertusaria fosseyae A.W.Archer *et al.*, *Nova Hedwigia* 88: 313 (2009)
Illustration: Figures 3F & 4A.
Distribution: So far only known from Africa, described from Congo and Rwanda (Archer *et al.*, 2009).
Notes: *Pertusaria fosseyae* is a corticolous, sorediate taxon with a shiny, grey-green thallus and contains the stictic acid and lichexanthone chemosyndromes (Archer *et al.*, 2009).
Specimens examined: Kenya: Eastern Prov., Chogoria route, 5 km from the edge of forest towards KWS park gate, 2018 m, 00˚14´S, 37˚32'E, 1.10.2010, *Kirika et al. 1401, 1414* (EA, F); *ca.* 3 km from KWS Chogoria park gate towards end road, 3043 m, 00˚09'S, 37˚25'E, 4.10.2010, *Kirika et al. 1812, 1823* (EA); Sirimon route, 1 km from KWS park gate towards the Old Moses Camp, 2660 m, 00˚00'S, 37˚15'E, 6.10.2010, *Kirika et al. 1972, 1983* (EA); *ca.* 3 km from KWS park gate towards Old Moses Camp, 2870 m, 00˚00'S, 37˚15'E, 8.10.2010, *Kirika et al. 2106* (EA, F); Towards Old Moses Camp, 3080 m, 00˚01'S, 37˚16'E, 8.10.2010, *Kirika et al. 2176* (EA).

Pertusaria lambinonii A.W.Archer *et al.*, *Nova Hedwigia* 88: 318 (2009)
Illustration: Figure 4B.
Distribution: Hitherto known from Burundi, Congo, and Rwanda (Archer *et al.*, 2009).
Notes: This saxicolous taxon is characterised by having asci with eight, rough-walled ascospores and containing planaic acid, 2'-*O*-methylperlatolic acid, protocetraric acid, and lichexanthone (Archer *et al.*, 2009).
Specimens examined: Kenya: Eastern Prov., Chogoria route, towards KWS Park gate, 2475 m, 00˚11'S, 37˚29'E, 4.10.2010, *Kirika et al. 1641, 1642A, 1645, 1718* (EA, F).

Pertusaria maritima A.W.Archer & Elix, *Telopea* 6: 19 (1994)
Distribution: Paleotropical (Archer & Elix, 1994; Archer, 1997; Archer *et al.*, 2009).
Notes: *Pertusaria maritima* is a corticolous, sorediate species containing thiophaninic acid. The Australian collections were reported to contain the stictic acid chemosyndrome complex in addition and may not be conspecific with the African material (Archer *et al.*, 2009).
Specimens examined: Kenya: Eastern Prov., Chogoria route, towards KWS Park gate, 2475 m, 00˚11'S, 37˚29'E, 4.10.2010, *Kirika et al. 1722* (EA, F).

Pertusaria pilosula A.W.Archer & Elix, in Archer, *Bibl. Lichenol.* 69: 127 (1997)
Distribution: Paleotropical (Archer, 1997; Archer *et al.*, 2009).
Notes: This isidiate taxon is characterized by containing 2'-*O*-methlyperlatolic acid and 4,5-dichlorolichexanthone (and in Australia also the stictic acid chemosyndrome).
Specimens examined: Kenya: Eastern Prov., Chogoria route, 1.5 km from KFS station towards the KWS park gate, 1827 m, 00˚14´S, 37˚34´E, 30.09.2010, *Kirika et al. 1232,* (EA); Sirimon route, towards KWS Sirimon gate park gate, 2465 m, 00˚01'N, 37˚14'E, 6.10.2010, *Kirika et al. 1860* (EA); 1 km from KWS park gate towards the Old Moses Camp, 2660 m, 00˚00'S, 37˚15'E, 6.10.2010, *Kirika et al. 2000* (EA); Towards Old Moses Camp, 3080 m, 00˚01'S, 37˚16'E, 8.10.2010, *Kirika et al. 2173* (EA); Central Prov., Naro Moru Route, E of Metereological Station, 3080 m alt., 0˚11'N, 37˚14'E, 25.01.2010, *Kirika et al. 1094* (EA, F).

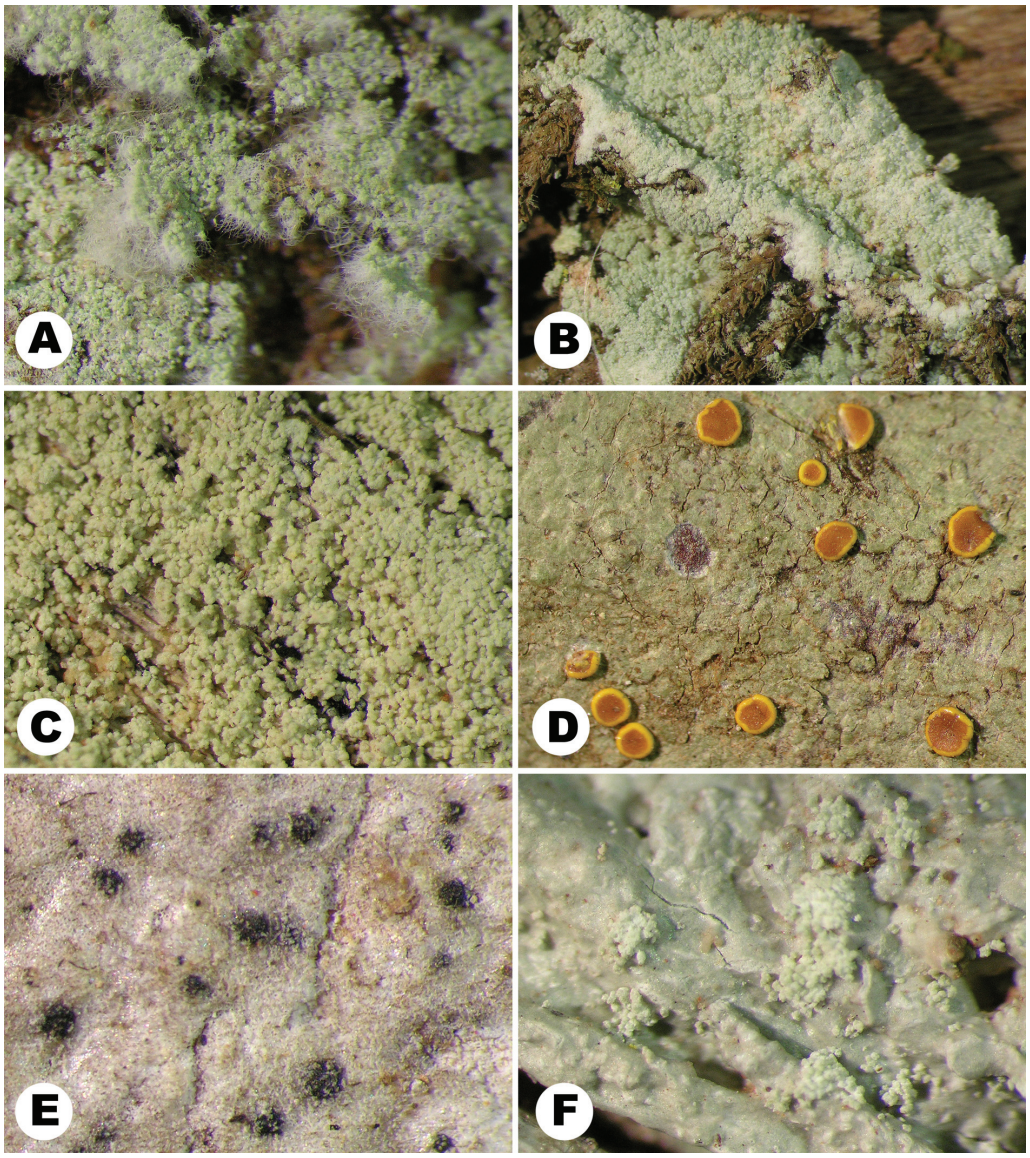

Figure 3. A. Lepraria incana, *Kirika 1542 (EA). B.* L. lobificans, *Kirika 2136 (EA). C.* L. usnica, *Kirika 1720 (EA). D.* Letrouitia flavocrocea, *Kirika 1221 (EA). E.* Mycoporum sparsellum, *Kirika 1235 (EA). F.* Pertusaria fosseyae, *Kirika 2106 (EA).*

Pertusaria scaberula A.W.Archer, *Mycotaxon* 41: 240 (1991)
Illustration: Figure 4C.
Distribution: Paleotropical, previously recorded from Congo and Rwanda in Africa (Archer, 1991, 1997; Archer *et al.*, 2009).
Notes: This is a corticolous lichen that is characterized by having disciform ascomata and soralia, and containing thamnolic acid (Archer, 1997).
Specimens examined: Kenya: Eastern Prov., Chogoria route, towards KWS Park gate, 2475 m, 00˚11'S, 37˚29'E, 4.10.2010, *Kirika et al.1680, 1712* (EA, F); Sirimon route, 1 km from KWS park gate towards the Old Moses Camp, 2660 m, 00˚00'S, 37˚15'E, 6.10.2010, *Kirika et al. 1932, 1934, 2017* (EA); Sirimon route *ca.* 3 km form KWS park gate towards Old Moses Camp, 2870 m, 00˚00'S, 37˚15'E, 8.10.2010, *Kirika et al. 2121, 2125, 2143* (EA).

Pertusaria subrigida Müll.Arg., *Bull. Herb. Boissier* 3: 636 (1895)
Illustration: Figure 4D.
Distribution: Pantropical, previously known from Australia, Brazil, and Rwanda (Archer *et al.*, 2009).
Notes: This species has flattened verrucae, 8-spored asci, and lacks secondary metabolites (Archer, 1997).
Specimens examined: Kenya: Eastern Prov., Chogoria route, towards KWS Park gate, 2475 m, 00˚11'S, 37˚29'E, 4.10.2010, *Kirika et al. 1699* (EA, F).

Pertusaria velata (Turner) Nyl., *Lich. Scand.*: 179 (1861)
Illustration: Figure 4E.
Distribution: Cosmopolitan (Archer & Messuti, 1997).
Notes: This species is readily distinguished by its disciform ascomata, 1-spored asci and the presence of lecanoric acid, ±lichenxanthone (Dibben, 1980; Archer & Messuti, 1997).
Specimens examined: Kenya: Eastern Prov., Chogoria route, 1.5 km from KFS station towards the KWS park gate, 1827 m, 00˚14´S, 37˚34´E, 30.09.2010, *Kirika et al. 1223* (EA, F); Chogoria Track, close to Chogoria Gate, 2960 m alt., 0˚09'S, 37˚26'E, 27.01.2010, *Kirika et al. 1175* (EA, F); Central Prov., Bantu Lodge at NW entrance of park, 1960 m, 0˚07'S, 37˚03'E, 25.01.2010, *Kirika et al. 1105* (EA, F).

Phaeographis dendritica (Ach.) Müll.Arg., *Flora* 65: 382 (1882)
Illustration: Figure 4F.
Distribution: Subcosmopolitan (Staiger, 2002; Smith *et al.*, 2009).
Notes: This species has a basally closed and carbonized exciple, inspersed hymenium, 8-spored asci with transversely sepatate, brown, non-amyloid ascospores, and contains the norstictic acid chemosyndrome (Staiger, 2002; Smith *et al.*, 2009); its thallus is white and ecorticate.
Specimens examined: Kenya: Eastern Prov., Chogoria route, 1.5 km from KFS station towards the KWS park gate, 1827 m, 00˚14´S, 37˚34´E, 30.09.2010, *Kirika et al. 1219* (EA, F).

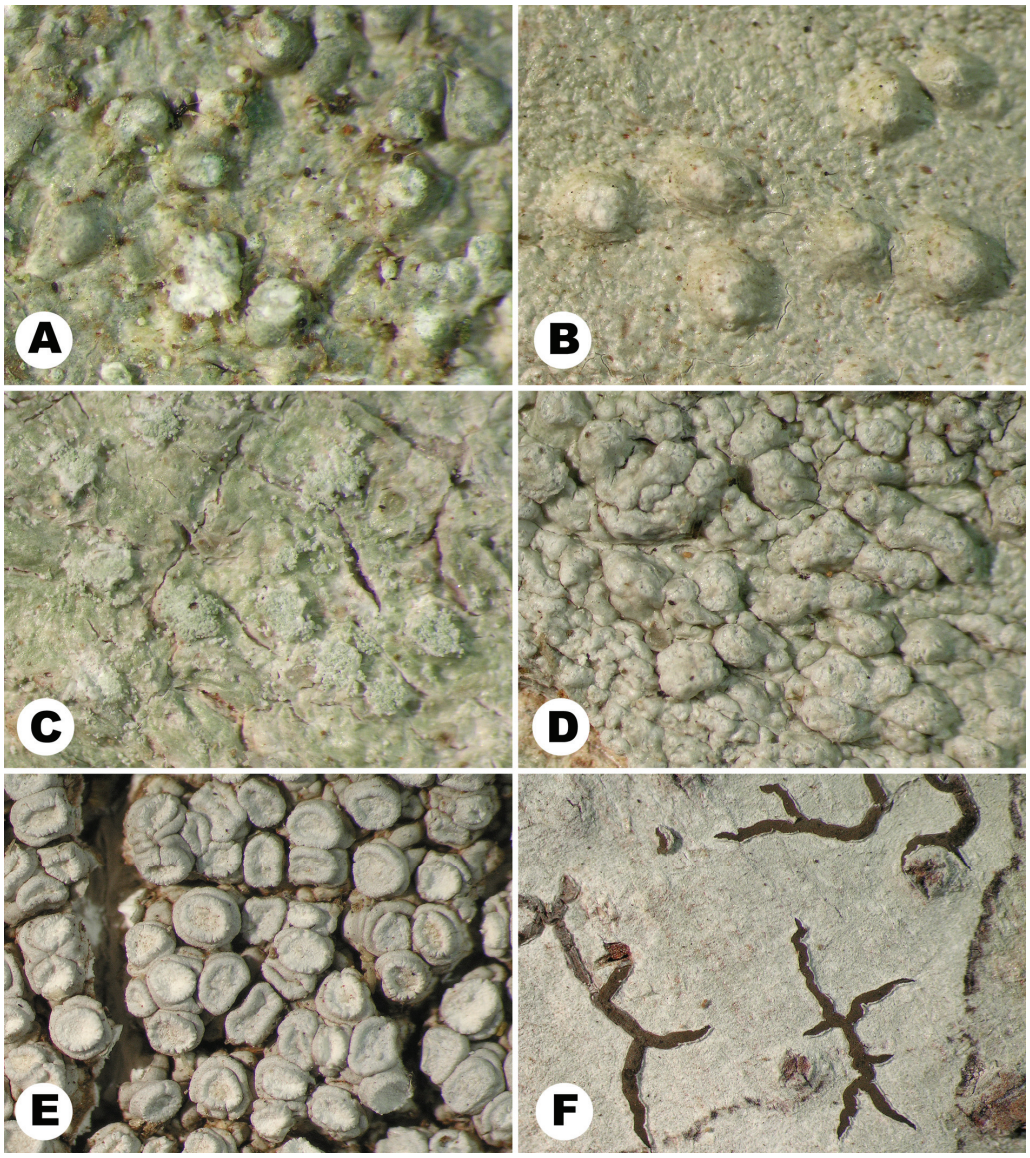

Figure 4. A. Pertusaria fosseyae, *Kirika 1401 (EA). B.* P. lambinonii, *Kirika 1642A (EA). C.* P. scaberula, *Kirika 1712 (EA). D.* P. subrigida, *Kirika 1699 (EA). E.* P. velata, *Kirika 1223 (EA). F.* Phaeographis dendritica, *Kirika 1219 (EA).*

Phaeographis girringunensis A.W.Archer & Elix, *Australas. Lichenol.* 63: 27 (2008)
Illustration: Figure 5A.
Distribution: Paleotropical, previously known from Queensland in Australia (Archer & Elix, 2008); new to Africa.
Notes: The species is characterized by sessile lirellae with slightly pruinose discs, a thin, carbonized exciple, predominantly 6-locular ascospores, and the presence of the stictic acid chemosyndrome (Archer & Elix, 2008; Archer, 2009).
Specimens examined: Kenya: Eastern Prov., Chogoria route, 1.5 km from KFS station towards the KWS park gate, 1827 m, 00˚14´S, 37˚34´E, 30.09.2010, *Kirika et al. 1267* (EA); Chogoria route, 5 km from the edge of forest towards KWS park gate, 2018 m, 00˚14 S, 37˚32'E, 1.10.2010, *Kirika et al. 1454* (EA).

Piccolia elmeri (Vain.) Hafellner, *Bibl. Lichenol.* 58: 116 (1995)
Illustration: Figure 5B.
Distribution: Paleotropical, previously recorded from the Philippines and Papua New Guinea (Hafellner, 1995); new to Africa.
Notes: This species has apothecia with a rust-brown pruina, a whitish grey thallus, purple crystals in the exciple, and multispored asci (Hafellner, 1995).
Specimens examined: Kenya: Eastern Prov., Chogoria route, 1.5 km from KFS forest station towards the KWS park gate, 1827 m, 00˚14´S, 37˚34´E,30.09.2010, *Kirika et al. 1302, 1310* (EA).

Placynthiella icmalea (Ach.) Coppins & P.James, *Lichenologist* 16: 244 (1984)
Distribution: Cosmopolitan (Smith *et al.*, 2009).
Notes: *Placynthiella icmalea* is a widespread, cosmopolitan species that forms characteristic, brown, isidiate crusts with small, dark brown apothecia that contain asci of the *Trapelia*-type with broadly ellipsoid, single-celled ascospores, and contains the gyrophoric acid chemosyndrome (Coppins & James, 1984; Lumbsch, 1997; Smith *et al.*, 2009).
Specimens examined: Kenya: Central Prov., Naro Moru Route, E of Metereological Station, 3080 m alt., 0˚11'N, 37˚14'E, 25.01.2010, *Kirika et al. 1066* (EA, F).

Porina brisbanensis Müll.Arg., *Nuovo Giorn. Bot. Ital.* 23: 402 (1891)
Illustration: Figure 5C.
Distribution: Pantropical.
Notes: This species differs from *Porina internigrans* (Nyl.) Müll. Arg. in having an indistinct prothallus and an often conspicuously cracked thallus and particularly in the fine cracks radiating from the ostiolar area (Lumbsch *et al.*, 2011b).
Specimens examined: Kenya: Eastern Prov., Chogoria route, 5 km from the edge of forest towards KWS park gate, 2018 m, 00˚14'S, 37˚32'E, 1.10.2010, *Kirika et al.1459* (EA, F); along Chogoria route towards KWS park gate, 2232 m, 00˚13'S, 37˚31'E, 5.10.2010, *Kirika et al. 1594* (EA, F); Chogoria Track, 27.01.2010, *Kirika et al.*1189 (EA, F).

Porina conspersa Malme, *Ark. Bot.* 23A(1): 16 (1929)
Distribution: Pantropical.
Notes: This species is characterized by comparatively narrow, 7-septate ascospores and the formation of isidia on the thallus.
Specimens examined: Kenya: Eastern Prov., Chogoria route, 5 km from the edge of forest towards KWS park gate, 2018 m, 00˚14'S, 37˚32'E, 1.10.2010, *Kirika et al. 1468* (EA).

Porina distans Vězda & Vivant, in Vězda, *Nova Hedwigia* 58: 136 (1994)
Distribution: Pantropical (McCarthy, 2001).
Notes: This taxon is characterized by having cylindrical isidia, otherwise the thallus is similar to *P. imitatrix* (Vězda, 1994). The name is applied here to sterile specimens, since several species of *Porina* can produce the same isidia.
Specimens examined: Kenya: Eastern Prov., Chogoria route, 5 km from the edge of forest towards KWS park gate, 2018 m, 00˚14'S, 37˚32'E, 1.10.2010, *Kirika et al. 1385, 1390, 1392* (EA, F).

Porina exocha (Nyl.) P.M.McCarthy, *Lichenologist* 32: 23 (2000)
Distribution: Paleotropical (McCarthy, 2001); new to Africa.
Notes: This species has large perithecial verrucae and large, muriform ascospores (McCarthy, 1995, 2001).
Specimens examined: Kenya: Eastern Prov., Chogoria route, 1.5 km from KFS station towards the KWS park gate, 1827 m, 00˚14´S, 37˚34´E, 30.09.2010, *Kirika et al.1260* (EA).

Porina internigrans (Nyl.) Müll.Arg., *Rep. Meet. Australs. Ass. Adv. Sci.*: 452 (1895)
Distribution: Pantropical (McCarthy, 2001); new to Africa.
Notes: This *Porina* species has perithecia immersed in verrucae and transversely, predominantly 9–11-septate ascospores (McCarthy, 2001).
Specimens examined: Kenya: Eastern Prov., Chogoria route, 5 km from the edge of forest towards KWS park gate, 2018 m, 00˚14'S, 37˚32'E, 1.10.2010, *Kirika et al. 1471* (EA).

Porina nucula Ach., *Syn. Lich.*: 112 (1814)
Distribution: Pantropical (McCarthy, 2003), previously known from the Canary Islands, West Africa and Tanzania (Alstrup & Aptroot, 2005).
Notes: *Porina nucula* has large hemispherical verrucae in which the perithecia are immersed and transversely, 7-septate, relatively broad ascospores (McCarthy, 2001).
Specimens examined: Kenya: Eastern Prov., Chogoria route, 1.5 km from KFS station towards the KWS park gate, 1827 m, 00˚14´S, 37˚34´E, 30.09.2010, *Kirika et al. 1206* (EA); Chogoria route, 5 km from the edge of forest towards KWS park gate, 2018 m, 00˚14 S, 37˚32'E, 1.10.2010, *Kirika et al. 1379, 1382, 1457* (EA); along Chogoria route towards KWS park gate, 2232 m, 00˚13'S, 37˚31'E, 5.10.2010, *Kirika et al. 1627* (EA).

Porina nuculastrum (Müll.Arg.) R.C.Harris, *More Florida Lichens*: 174 (1995)
Illustration: Figure 5D.
Distribution: Pantropical, previously recorded from Madagascar in Africa (McCarthy, 2001).
Notes: This is another *Porina* sp. with muriform ascospores, which differs from *P. exocha* in having (0–)1(–2) longitudinal septa (McCarthy, 2001).
Specimens examined: Kenya: Eastern Prov., Chogoria route, 1.5 km from KFS station towards the KWS park gate, 1827 m, 00˚14´S, 37˚34´E, 30.09.2010, *Kirika et al. 1251, 1316* (EA, F).

Pyrenula acutispora Kalb & Hafellner, *Herzogia* 9: 84 (1992)
Illustration: Figure 5E.
Distribution: Pantropical (Aptroot *et al.*, 2008).
Notes: This *Pyrenula* species is characterised by large, fusiform ascospores with pointed ends (Kalb & Hafellner, 1992; Aptroot *et al.*, 2008).

Specimens examined: Kenya: Eastern Prov., Chogoria route, towards KWS Park gate, 2475 m, 00˚11'S, 37˚29'E, 4.10.2010, *Kirika et al.1649* (EA, F).

Pyrenula nitidula (Bres.) R.C.Harris, in Aptroot *et al.*, *Bibl. Lichenol.* 64: 164 (1997)
Distribution: Pantropical, extending into subtropical and temperate regions (Aptroot, 2009).
Notes: *Pyrenula nitidula* is characterized by having a brownish to olive-green thallus without pseudocyphellae, a clear hamathecium, 3-septate ascospores with rounded ends and terminal lumina lying directly against the exospore, and lacking secondary metabolites (Aptroot, 2009).
Specimens examined: Kenya: Eastern Prov., Chogoria route, 5 km from the edge of forest towards KWS park gate, 2018 m, 00˚14'S, 37˚32'E, 1.10.2010, *Kirika et al. 1448, 1487* (EA).

Pyrenula santensis (Nyl.) Müll.Arg., *Flora* 65: 400 (1882)
Distribution: Pantropical (Harris, 1995), previously recorded from Tanzania (Alstrup & Aptroot, 2005).
Notes: This species has a brownish to olive-green thallus without pseudocyphellae, a clear hamathecium, 3-septate ascospores with rounded ends and terminal lumina separated from the exospore by an endospore layer, and lacks secondary metabolites (Aptroot, 2009).
Specimens examined: Kenya: Eastern Prov., Chogoria route, 1.5 km from KFS station towards the KWS park gate, 1827 m, 00˚14´S, 37˚34´E, 30.09.2010, *Kirika et al. 1294,* (EA); along Chogoria route towards KWS park gate, 2232 m, 00˚13'S, 37˚31'E, 5.10.2010, *Kirika et al. 1605, 1636* (EA, F).

Ramboldia russula (Ach.) Kalb, Lumbsch & Elix, *Nova Hedwigia* 86: 37 (2008)
Distribution: Pantropical (Kalb *et al.*, 2008).
Notes: This species has a whitish grey thallus and red apothecia. It contains lichexanthone, the fumarprotocetraric acid chemosyndrome and the pigment russulone in the apothecia (Kalb *et al.*, 2008).
Specimens examined: Kenya: Central Prov., Bantu Lodge at NW entrance of park, 1960 m alt., 0˚07'S, 37˚03'E, 25.01.2010, *Kirika et al. 1097* (EA).

Sticta kunthii Hook.f., in Kunth, *Syn. Plant. Aequinoct. Orb. Novi* 1: 29 (1822)
Distribution: Pantropical; thus far only known from the Neotropics.
Notes: This species is characterized by a thallus surface with numerous depressions, sometimes appearing almost pitted, a pale lower tomentum with medium-sized cyphellae, and apothecia with short marginal hairs.
Specimens examined: Kenya: Eastern Prov., Chogoria route, towards KWS park gate, 2687 m, 00˚10'S, 37˚27'E, 4.10.2010, *Kirika et al. 1749* (EA, F).

Thelotrema canarense Patw. & C.R.Kulk., *Norw. J. Bot.* 24: 128 (1977)
Distribution: Paleotropical, previously recorded from Tanzania in East Africa (Frisch *et al.*, 2006).
Notes: *Thelotrema canarense* is characterized by the presence of small, submuriform ascospores (8/ascus), an ecorticate thallus, and the presence of norstictic acid (Frisch *et al.*, 2006; Rivas Plata *et al.*, 2010).
Specimens examined: Kenya: Eastern Prov., Chogoria route, 5 km from the edge of forest towards KWS park gate, 2018 m, 00˚14 S, 37˚32'E, 1.10.2010, *Kirika et al. 1444* (EA).

Thelotrema diplotrema Nyl., *Annls Sci. Nat.*, Bot., sér. 4, 11: 258 (1859)
Illustration: Figure 5F.
Distribution: Pantropical, previously recorded from Cameroon, South Africa and Tanzania (Frisch *et al.*, 2006; Mangold *et al.*, 2009).
Notes: This taxon is characterized by immersed to slightly emergent apothecia, large, transversely septate, thick-walled, amyloid ascospores, and the lack of secondary metabolites (Frisch *et al.*, 2006; Mangold *et al.*, 2009).
Specimens examined: Kenya: Eastern Prov., Chogoria route, towards KWS park gate, 2475 m, 00˚11'S, 37˚29'E, 4.10.2010, *Kirika et al. 1711* (EA, F).

Trapeliopsis flexuosa (Fr.) Coppins & P.James, *Lichenologist* 16: 258 (1984)
Distribution: Cosmopolitan (Smith *et al.*, 2009).
Notes: A widespread species on wood and bark (rarely on siliceous rocks) that has a greenish grey to grey-green thallus. It resembles *T. granulosa,* a species that is more common on soil and has larger granules and more granular soredia (Coppins & James, 1984; Smith *et al.*, 2009).
Specimens examined: Kenya: Central Prov., Naro Moru Route, E of Metereological Station, 3080 m alt., 0˚11'N, 37˚14'E, 25.01.2010, *Kirika et al. 1071* (EA, F).

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REFERENCES

Ahti, T., H. Krog & T.D.V. Swinscow (1987). New or otherwise interesting *Cladonia* species in East Africa. *Annales Botanici Fennici* **24**: 85–94.

Almborn, O. (1989). Revision of the lichen genus *Teloschistes* in central and southern Africa. *Nordic Journal of Botany* **8**: 521–537.

Alstrup, V. & A. Aptroot (2005). Pyrenocarpous lichens from Tanzania and Kenya. *Cryptogamie, Mycologie* **26**: 265–271.

Aptroot, A. (2002). New and interesting lichens and lichenicolous fungi in Brazil. *Fungal Diversity* **9**: 15–45.

Aptroot, A. (2009). Pyrenulaceae.. In P.M. McCarthy (ed.), *Flora of Australia Vol* **57**. ABRS and CSIRO Publishing, Canberra, Pp. 449–480.

Aptroot, A., P. Diederich, E. Sérusiaux & H.J.M. Sipman (1997). Lichens and lichenicolous fungi from New Guinea. *Bibliotheca Lichenologica* **64**: 1–220.

Aptroot, A., R. Lücking, H.J.M. Sipman, L. Umaña & J.L. Chaves (2008). Pyrenocarpous lichens with bitunicate asci. A first assessment of the lichen biodiversity inventory in Costa Rica. *Bibliotheca Lichenologica* **97**: 1–162.

Archer, A.W. (1991). New species and new reports of *Pertusaria* (lichenised Ascomycotina) from Australia and New Zealand with a key to the species in Australia. *Mycotaxon* **41**: 223–269.

Archer, A.W. (1997). The lichen genus *Pertusaria* in Australia. *Bibliotheca Lichenologica* **69**: 1–162.

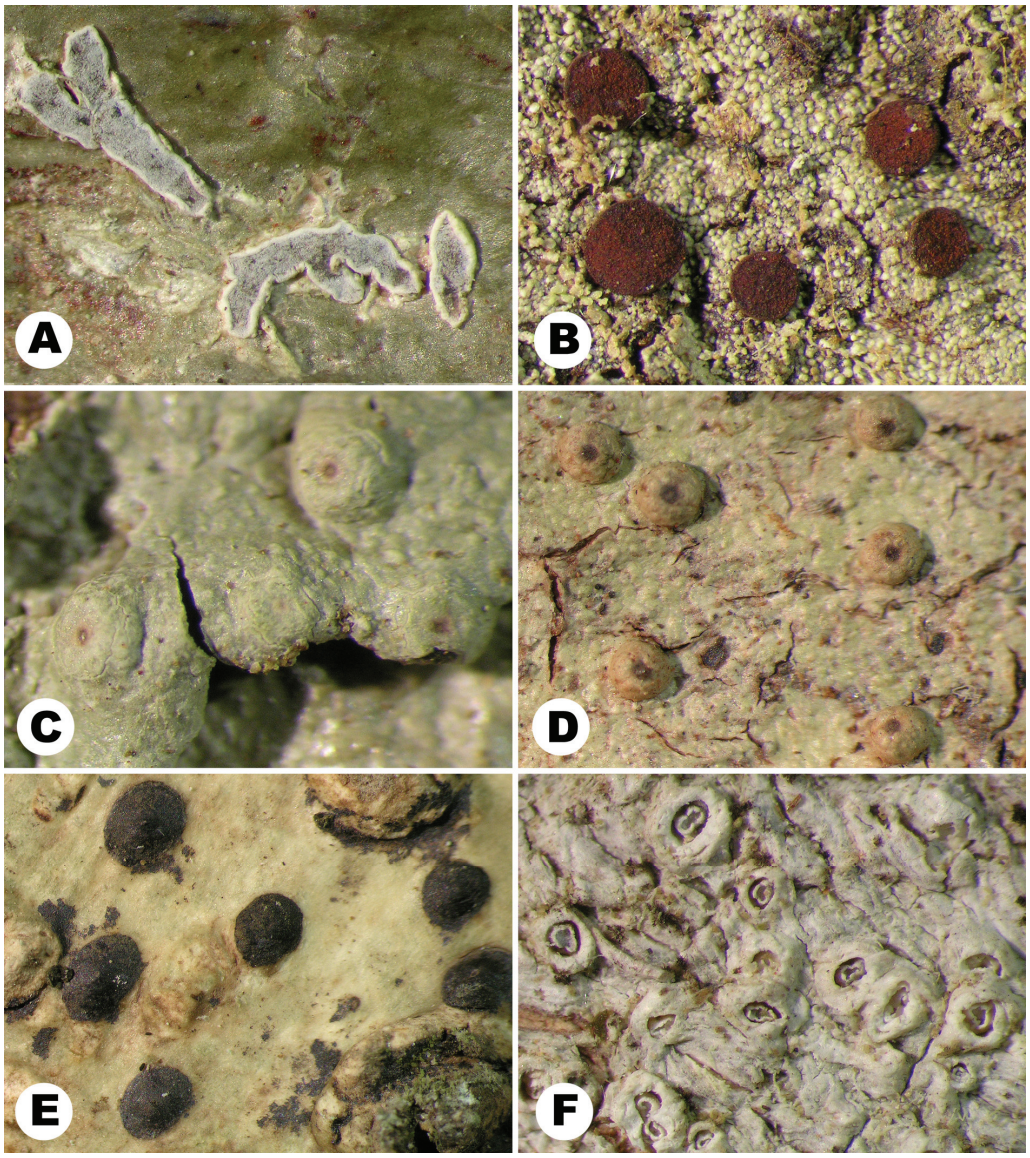

Figure 5. A. Phaeographis girringunensis, *Kirika 1454 (EA). B.* Piccolia elmeri, *Kirika 1310 (EA). C.* Porina brisbanensis, *Kirika 1459 (EA). D.* P. nuculastrum, *Kirika 1316 (EA). E.* Pyrenula acutispora, *Kirika 1649 (EA). F.* Thelotrema diplotrema, *Kirika 1711 (EA).*

Archer, A.W. (2006). The lichen family Graphidaceae in Australia. *Bibliotheca Lichenologica* **94**: 1–191.

Archer, A.W. (2009). Graphidaceae. In P.M. McCarthy (ed.), *Flora of Australia Vol* **57**. ABRS and CSIRO Publishing, Canberra, Pp. 84–194.

Archer, A.W. & J.A. Elix (1994). The lichens of Lord Howe Island. 1. Introduction and the genus *Pertusaria* (Pertusariaceae). *Telopea* **6**: 9–30.

Archer, A.W. & J.A. Elix (2008). Three new species in the Australian Graphidaceae (lichenized Ascomycota). *Australasian Lichenology* **63**: 26–29.

Archer, A.W., J.A. Elix, E. Fischer, D. Killmann & E. Serusiaux (2009). The lichen genus *Pertusaria* (Ascomycota) in Central Africa (Congo/Kivu, Rwanda and Burundi) and western Kenya. *Nova Hedwigia* **88**: 309–333.

Archer, A.W. & M.I. Messuti (1997). *Pertusaria velata* (Turner) Nyl. and its synonyms. *Mycotaxon* **61**: 375–379.

Awasthi, D.D. (1991). A key to the microlichens of India, Nepal and Sri Lanka. *Bibliotheca Lichenologica* **40:** 1–340.

Brako, L. (1991). *Phyllopsora* (Bacidiaceae). In S.R. Gradstein (ed.), *Flora Neotropica*, *Vol.* **55**. New York Botanical Garden, New York. Pp. 1–66.

Cengia Sambo, M. (1938). Licheni del Kenia e del Tanganica raccotti dai rev. Padri della Consolata. *Nuovo Giornale Botanico Italiano* **45**: 364–387.

Coppins, B.J. & P.W. James (1984). New or interesting British lichens V. *Lichenologist* **16**: 241–264.

Dibben, M.J. (1980). The chemosystematics of the lichen genus *Pertusaria* in North America north of Mexico. *Publications in Biology and Geology, Milwaukee Public Museum* **5:** 1–162.

Dodge, C.W. (1953). Some lichens from tropical Africa. *Annals of the Missouri Botanical Garden* **40**: 271–401.

Dodge, C.W. (1956). Some lichens of tropical Africa. II. *Usnea*. *Annals of the Missouri Botanical Garden* **43**: 381–396.

Dodge, C.W. (1957). Some lichens of tropical Africa. II. *Usnea*. *Annals of the Missouri Botanical Garden* **44**: 1–76.

Dodge, C.W. (1959). Some lichens of tropical Africa. III. Parmeliaceae. *Annals of the Missouri Botanical Garden* **46**: 39–193.

Dodge, C.W. (1964). Some lichens of tropical Africa. IV: Dermatocarpaceae to Pertusariaceae. *Beihefte zur Nova Hedwigia* **12**: 1–282.

Dodge, C.W. (1971). Some lichens of tropical Africa. V. Lecanoraceae to Physciaceae. *Beihefte zur Nova Hedwigia* **38**: 1–225.

Egea, J.M. & P. Torrente (1994). El género de hongos liquenizados *Lecanactis* (Ascomycotina). *Bibliotheca Lichenologica* **54**: 1–205.

Elix, J.A. (2002). New species of *Xanthoparmelia* (lichenized Ascomycotina, Parmeliaceae) from Africa. *Lichenologist* **34**: 283–291.

Elix, J.A. (2009a). Letrouitiaceae. In P.M McCarthy (ed.), *Flora of Australia Vol* **57**. ABRS and CSIRO Publishing, Canberra, Pp. 483–493.

Elix, J.A. (2009b). Stereocaulaceae. In P.M McCarthy (ed.), *Flora of Australia Vol* **57**. ABRS and CSIRO Publishing, Canberra, Pp. 60–73.

Elix, J.A. (2010). Two new species, a new combination and new chemical data for *Heterodermia* (Physciaceae: Ascomycota). *Australasian Lichenology* **67**: 3–9.

Elix, J.A. & P.M. McCarthy (1998). Catalogue of the lichens of the smaller Pacific islands. *Bibliotheca Lichenologica* **70**: 1–361.

Feuerer, T. (2011). Checklist of lichens and lichenicolous fungi of Kenya (preliminary version 1 March 2008).http://www.biologie.uni-hamburg.de/checklists/africa/kenya_l.htm [accessed February 9, 2012].

Frisch, A., K. Kalb & M. Grube (2006). Contributions towards a new systematics of the lichen family Thelotremataceae. *Bibliotheca Lichenologica* **92**: 1–539.

Frisch, A. & L. Tibell (2010). New data on crustose mazaediate lichens from tropical Africa. *Bibliotheca Lichenologica* **104:** 323–332.

Guderley, R. (1999). Die *Lecanora subfusca*-Gruppe in Süd- und Mittelamerika. *Journal of the Hattori Botanical Laboratory* **87**: 131–257.

Hafellner, J. (1981). Monographie der Flechtengattung *Letrouitia* (Lecanorales, Teloschistineae). *Nova Hedwigia* **35**: 645–729.

Hafellner, J. (1995). Über *Piccolia*, eine lichenisierte Pilzgattung der Tropen (Ascomycotina, Lecanorales). *Bibliotheca Lichenologica* **58**: 107–122.

Hafellner, J. & J. Poelt (1979). Die Arten der Gattung *Caloplaca* mit plurilocularen Sporen (*Meroplacis, Triophthalmidium, Xanthocarpia*). *Journal of the Hattori Botanical Laboratory* **46**: 1–41.

Harada, H. (1993). *Agonimiella*, a new genus in the family Verrucariaceae (Lichenes). *Nova Hedwigia* **57**: 503–510.

Harris, R.C. (1984). *Megalospora porphyritis* in eastern North America. *Evansia* **1**: 24.

Harris, R.C. (1986). *Megalospora porphyritis* again: a reply to Sipman. *Evansia* **3**: 30.

Harris, R.C. (1995). *More Florida Lichens. Including the 10c Tour of the Pyrenolichens.* Publ. by the Author, Bronx, New York.

Henssen, A. & A. Titze (1990). *Auriculora byssomorpha*, a tropical lichen with a remarkable developmental morphology. *Botanica Acta* **103**: 131–139.

Hue (1916). Lichenes Poncinsianos in Africa tropico-orientali anglica a Vicecomite de Poncins anno 1912 lectos elaboravit. *Bulletin de la Societé Botanique de France* **63**: 1–24.

Jørgensen, P.M. (2003). Notes on African Pannariaceae (lichenized ascomycetes). *Lichenologist* **35**: 11–20.

Kalb, K. (2004). New or otherwise interesting lichens II. *Bibliotheca Lichenologica* **88**: 301–329.

Kalb, K. (2007). New or otherwise interesting lichens III. *Bibliotheca Lichenologica* **95**: 297–316.

Kalb, K. (2008). New or otherwise interesting lichens. IV. *Sauteria* **15**: 239–248.

Kalb, K. & J. Hafellner (1992). Bemerkenswerte Flechten und lichenicole Pilze von der Insel Madeira. *Herzogia* **9**: 45–102.

Kalb, K., B. Staiger & J.A. Elix (2004). A monograph of the lichen genus *Diorygma*—a first attempt. *Symbolae Botanicae Upsalienses* **34**(1): 133–181.

Kalb, K., B. Staiget, J.A. Elix, U. Lange & H.T. Lumbsch (2008). A new circumscription of the genus *Ramboldia* (Lecanoraceae, Ascomycota) based on morphological and molecular evidence. *Nova Hedwigia* **86**: 23–42.

Krog, H. & T.D.V. Swinscow (1974). *Ramalina* species with a hollow thallus (Fistularia) in East Africa. *Norwegian Journal of Botany* **21**: 111–124.

Krog, H. & T.D.V. Swinscow (1975a). Parmeliaceae, with the exclusion of *Parmelia* and *Usnea*, in East Africa. *Norwegian Journal of Botany* **22**: 115–123.

Krog, H. & T.D.V. Swinscow (1975b). Some *Ramalina* species with punctiform pseudocyphellae in East Africa. *Norwegian Journal of Botany* **22**: 269–276.

Krog, H. & T.D.V. Swinscow (1976). The genus *Ramalina* in East Africa. *Norwegian Journal of Botany* **23**: 153–175.

Krog, H. & T.D.V. Swinscow (1977). The *Parmelia borreri* group in East Africa. *Norwegian Journal of Botany* **24**: 167–177.

Krog, H. & T.D.V. Swinscow (1979). *Parmelia* subgenus *Hypotrachyna* in East Africa. *Norwegian Journal of Botany* **26**: 11–43.

Krog, H. & T.D.V. Swinscow (1981). *Parmelia* subgenus *Amphigymnia* (lichens) in East Africa. *Bulletin of the British Museum (Natural History), Botany Series* **9**: 143–231.

Krog, H. & T.D.V. Swinscow (1986). The lichen genera *Lasallia* and *Umbilicaria* in East Africa. *Nordic Journal of Botany* **6**: 75–85.

Krog, H. & T.D.V. Swinscow (1987). New species and new combinations in some parmelioid lichen genera, with special emphasis on East African taxa. *Lichenologist* **19**: 419–431.

Kurokawa, S. (1962). A monograph of the genus *Anaptychia*. *Beihefte zur Nova Hedwigia* **6**: 1–115.

Leuckert, C., H. Kümmerling & V. Wirth (1995). Chemotaxonomy of *Lepraria* Ach. and *Leproloma* Nyl. ex Crombie, with particular reference to Central Europe. *Bibliotheca Lichenologica* **58**: 245–259.

Leuckert, C. & J. Poelt (1989). Studien über die *Lecanora rupicola*-Gruppe in Europa (Lecanoraceae). *Nova Hedwigia* **49**: 121–167.

Lücking, R., A.W. Archer & A. Aptroot (2009). A world-wide key to the genus *Graphis* (Ostropales: Graphidaceae). *Lichenologist* **41**: 363–452.

Lücking, R., J.L. Chaves, H.J.M. Sipman, L. Umaña & A. Aptroot (2008a). A first assessment of the Ticolichen biodiversity inventory in Costa Rica: the genus *Graphis,* with notes on the genus *Hemithecium* (Ascomcyota: Ostropales: Graphidaceae). *Fieldiana (Botany)* **46**: 1–131.

Lücking, R., R. Del Prado, H.T. Lumbsch, S. Will-Wolf, A. Aptroot, H.J.M. Sipman, L. Umaña & J.L. Chaves (2008b). Phylogenetic patterns of morphological and chemical characters and reproductive mode in the *Heterodermia obscurata* group in Costa Rica. *Systematics and Biodiversity* **6**: 31–41.

Lücking, R. & K. Kalb (2002). New species and further additions to the foliicolous lichen flora of Kenya (East Africa), including the first lichenicolous *Aulaxina* (Ostropales: Gomphillaceae). *Botanical Journal of the Linnean Society* **139**: 171–180.

Lumbsch, H.T. (1994). Die *Lecanora subfusca*-Gruppe in Australasien. *Journal of the Hattori Botanical Laboratory* **77**: 1–175.

Lumbsch, H.T. (1997). Systematic studies in the suborder Agyriineae (Lecanorales). *Journal of the Hattori Botanical Laboratory* **83**: 1–73.

Lumbsch, H.T., T. Ahti, S. Altermann, G. Amo, A. Aptroot, U. Arup, A. Barcenas Peña, P.A. Bawingan, M.N. Benatti, L. Betancourt, C.R. Björk, K. Boonpragob, M. Brand, F. Bungartz, M. Caceres, M. Candan, J.L. Chaves, P. Clerc, R. Common, B.J. Coppins, A. Crespo, M. Dal Forno, P.K. Divakar, M.V. Duya, J.A. Elix, A. Elvebakk, J. Fankhauser, E. Farkas, L.I. Ferraro, E. Fischer, D.J. Galloway, E. Gaya, M. Giralt, T. Goward, M. Grube, J. Hafellner, J. Hernández, M.A. Herrera-Campos, K. Kalb, I. Kärnefelt, G. Kantvilas, D. Killmann, P. Kirika, K. Knudsen, H. Komposch, S. Kondratyuk, J.D. Lawrey, A. Mangold, M.P. Marcelli, B. Mccune, A. Michlig, R. Miranda Gonzalez, B. Moncada, A. Naikatini, M.P. Nelsen, D.O. Øvstedal, Z. Palice, K. Papong, S. Parnmen, S. Pérez-Ortega, C. Printzen, V.J. Rico, E. Rivas Plata, J. Robayo, D. Rosabal, U. Ruprecht, N. Salazar Allen, L. Sancho, L. Santos De Jesus, T. Santos Vieira, M. Schultz, M.R.D. Seaward, E. Sérusiaux, I. Schmitt, H.J.M. Sipman, M. Sohrabi, U. Søchting, M.Z. Søgaard, L. Sparrius, A.A. Spielmann, T. Spribille, J. Sutjaritturakan, A. Thammathaworn, A. Thell, G. Thor, H. Thüs, E. Timdal, C.

Truong, R. Türk, L. Umaña Tenorio, D.K. Upreti, P. Van Den Boom, M. Vivas Rebuelta, M. Wedin, S. Will-Wolf, V. Wirth, N. Wirtz, R. Yahr, K. Yeshitela, F. Ziemmeck & R. Lücking (2011a). One hundred new species of lichenized fungi: a signature of undiscovered global diversity. *Phytotaxa* **18**: 1–127.

Lumbsch, H.T. & J.A. Elix (1993). Notes on the circumscription of the lichens *Lecanora leprosa* and *L. sulphurescens* (Lecanoraceae, lichenised Ascomycotina). *Tropical Bryology* **7**: 71–75.

Lumbsch, H.T. & J.A. Elix (2004). Lecanora. In P.M. McCarthy & K. Mallett (eds.), *Flora of Australia*, Vol. **56A**. ABRS and CSIROPublishing, Canberra. Pp. 12–62.

Lumbsch, H.T. & S.M. Huhndorf (2010). Myconet Volume 14. Part One. Outline of Ascomycota - 2009. *Fieldiana (Life and Earth Sciences)* **1**: 1–42.

Lumbsch, H.T., R. Lücking, P. Divakar, M. Von Konrat & A. Naikatini (2011b). New records of lichen-forming fungi from Fiji. *Telopea* **13**: 375–404.

Lumbsch, H.T., M. Plümper, R. Guderley & G.B. Feige (1997). The corticolous species of *Lecanora* sensu stricto with pruinose apothecial discs. *Symbolae Botanicae Upsalienses* **32**(1): 131–161.

Maas Geesteranus, R.A. (1955). Some lichenological observations in Kenya. *Webbia* **11**: 519–523.

Mangold, A., J.A. Elix & H.T. Lumbsch (2009). Thelotremataceae. In P.M. McCarthy (ed.), *Flora of Australia Vol* **57**. ABRS and CSIRO Publishing, Canberra, Pp. 195–420.

Mangold, A., M.P. Martin, K. Kalb, R. Lucking & H.T. Lumbsch (2008). Molecular data show that *Topeliopsis* (Ascomycota, Thelotremataceae) is polyphyletic. *Lichenologist* **40**: 39–46.

McCarthy, P.M. (1995). A reappraisal of *Clathroporina* Müll. Arg. (Trichotheliaceae). *Lichenologist* **27**: 321–350.

McCarthy, P.M. (2001). Trichotheliaceae. In P.M. McCarthy (ed.), *Flora of Australia Vol* **58A**. ABRS and CSIRO Publishing, Melbourne, Pp. 105–157.

McCarthy, P.M. (2003). Catalogue of the lichen family Porinaceae. *Bibliotheca Lichenologica* **87:** 1–164.

Nelsen, M.P., H.T. Lumbsch, R. Lücking & J.A. Elix (2008). Further evidence for the polyphyly of *Lepraria* (Lecanorales: Stereocaulaceae). *Nova Hedwigia* **87**: 361–371.

Rivas Plata, E., R. Lücking, A. Aptroot, H.J.M. Sipman, L. Umana, J.L. Chaves & D. Lizano (2006). A first assessment of the Ticolichen biodiversity inventory in Costa Rica: the genus *Coenogonium* (Ostropales: Coenogoniaceae). *Fungal Diversity* **23**: 255–321.

Rivas Plata, E., R. Lücking & H.T. Lumbsch (2011). A new classification for the family Graphidaceae (Ascomycota: Lecanoromycetes: Ostropales). *Fungal Diversity* **52**: 107–121.

Rivas Plata, E., R. Lücking, H.J.M. Sipman, A. Mangold & H.T. Lumbsch (2010). A world-wide key to the thelotremoid *Graphidaceae*, excluding the *Ocellularia-Myriotrema-Stegobolus* clade. *Lichenologist* **42**: 139–185.

Saag, L., A. Saag & T. Randlane (2009). World survey of the genus *Lepraria* (Stereocaulaceae, lichenized Ascomycota). *Lichenologist* **41**: 25–60.

Sipman, H.J.M. (1983). A monograph of the lichen family Megalosporaceae. *Bibliotheca Lichenologica* **18**: 1–241.

Sipman, H.J.M. (1986). Additional notes on the lichen family Megalosporaceae. *Willdenowia* **15**: 557–564.

Sipman, H.J.M. (2003). New species of *Cryptothecia, Lepraria*, and *Ocellularia* (lichenized Ascomycetes) from Singapore. *Bibliotheca Lichenologica* **86**: 177–184.

Sipman, H.J.M. (2004). Survey of *Lepraria* species with lobed thallus margins in the tropics. *Herzogia* **17**: 23–35.

Smith, C.W., A. Aptroot, B.J. Coppins, A. Fletcher, O.L. Gilbert, P.W. James & P.A. Wolseley (2009). *The Lichens of Great Britain and Ireland*. The British Lichen Society, London.

Staiger, B. (2002). Die Flechtenfamilie Graphidaceae. Studien in Richtung einer natürlicheren Gliederung. *Bibliotheca Lichenologica* **85**: 1–526.

Staiger, B. & K. Kalb (1995). *Haematomma*-Studien. I. Die Flechtengattung *Haematomma*. *Bibliotheca Lichenologica* **59**: 3–198.

Swinscow, T.D.V. & H. Krog (1981). The genus *Phyllopsora,* with a report on East African species. *Lichenologist* **13**: 203–247.

Swinscow, T.D.V. & H. Krog (1988). *Macrolichens of East Africa*. British Museum, London.

Timdal, E. (2008). Studies on *Eschatogonia* (Ramalinaceae) in Peru. *Lichenologist* **40**: 31–38.

Untari, L.F. (2006). The lichen genus *Megalospora* in Java. *Mycotaxon* **97**: 129–143.

V□zda, A. (1989). *Lichenes Selecti Exsiccati. Fasc. XCIII (no. 2301–2325).* Published by author, Prague.

V□zda, A. (1994). Neue foliicole Flechten II. *Nova Hedwigia* **58**: 123–143.

Wirth, M. & M.E. Hale, Jr (1978). Morden-Smithsonian Expedition to Dominica: the lichens (Graphidaceae). *Smithsonian Contributions to Botany* **40**: 1–64.