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Cetraria (Parmeliaceae) and some related genera on the African continent

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ABSTRACT

Four species are reported new for the lichen flora of southern Africa: *Bryoria fuscescens* (Gyeln.) Brodo & D. Hawksw., *B. motykae* (D. Hawksw.) Brodo & D. Hawksw., *Cetraria chlorophylla* (Humb.) Vain. and *Platismatia glauca* (L.) Culb. & Culb. (Parmeliaceae), found at high elevations in Natal and south-west Cape. *B. fuscescens*, *B. motykae* and *P. glauca* were previously known from a few localities, also at high elevations, in east Africa. The genus *Cetraria* s. str. was previously unknown on the African continent.

UITTREKSEL

Vier spesies word nuut aangeteken vir die ligeen-flora van suidelike Afrika: *Bryoria fuscescens* (Gyeln.) Brodo & D. Hawksw., *B. motykae* (D. Hawksw.) Brodo & D. Hawksw., *Cetraria chlorophylla* (Humb.) Vain. en *Platismatia glauca* (L.) Culb. & Culb. (Parmeliaceae), wat hoog bo seespieël in Natal en suidwes-Kaap aangetref word. *B. fuscescens*, *B. motykae* en *P. glauca* was voorheen bekend vanaf 'n paar plekke, ook hoog bo seespieël, in oos-Afrika. Die genus *Cetraria* s. str. was voorheen onbekend op die vasteland van Afrika.

INTRODUCTION

During my work on the genera *Coelocaulon* and *Cornicularia* (Kärnefelt 1986), I came across a few noteworthy specimens in the Bolus Herbarium, University of Cape Town, collected by Ms Elsie Esterhuysen. Apart from the material of *Coelocaulon epiphorellum*, which was then new to Africa, Ms Esterhuysen's collections also included four other species new to southern Africa: *Bryoria fuscescens* (Gyeln.) Brodo & D. Hawksw., *B. motykae* (D. Hawksw.) Brodo & D. Hawksw., *Cetraria chlorophylla* (Humb.) Vain. and *Platismatia glauca* (L.) Culb. & Culb. (Parmeliaceae). With the discovery of *Cetraria chlorophylla* in southern Africa the genus *Cetraria* s. str. is also reported as being new to the African continent.

MATERIAL AND METHODS

The material from southern Africa was investigated chemically for secondary compounds and was compared anatomically with material from the northern hemisphere in LD, and with material from the east African mountains in UPS.

Cetraria chlorophylla *(Humb.) Vain.* in Acta Societatis pro Fauna et Flora Fennica 13: 7 (1896).

Lichen chlorophyllus Humb.: 20 (1793). Type: In cortice Pyni sylvestris beym Vorwerk Hals copiose (B, Willdenow).

Thallus subfruticose or foliose, ± 10–20 mm across; *lobes* irregularly branched, ± 0,5 mm broad at tips, ± 2–3 mm at base, weakly channelled to flat, with scattered *marginal soralia* especially towards the lobe tips, and scattered marginal cilia; *upper surface* brown to pale brown, glossy, rather smooth; *lower surface* paler brown to whitish, wrinkled or sulcate, with rather frequent pale rhizinae; *ascomata* and *conidiomata* not observed. *Cortex* paraplectenchymatous, ± 25–30 μm thick, covered by a thin ± 5 μm thick pigmented epicortical layer, composed of 1–2 layers of densely packed isodiametric cells with rather distinctive lumina; *photobiont* green and spherical forming a more or less continuous layer; *medulla* composed of loose hyphae; lower cortical layer similar to the upper layer (Figure 1C). *Reactions* K−, C−, KC− and P−. *Cetraria chlorophylla* contains protolichesterinic acid.

Cetraria chlorophylla is characterized by the rather small, subfruticose to foliose thallus, brown to usually more greenish brown in the northern hemisphere, and glossy lobes with scattered marginal soralia and cilia (Figure 1A). It is a locally common species both on conifers and on deciduous trees in north-western and central Europe (see Wirth 1980). In western North America it is also one of the most common foliose species (Hale 1979; Thomson 1984). In continental parts of Eurasia and North America, however, *C. chlorophylla* is very rare or lacking, and relatively mild and oceanic climatic regions provide conditions favourable for the growth of this species. *C. chlorophylla* has also been reported from Japan (Sato 1965) and from Tierra del Fuego (Räsänen 1932) and Australia (Filson 1983) in the southern hemisphere. The species was, however, not treated by Galloway (1985) in the new lichen flora of New Zealand.

The material from southern Africa was collected at 750–900 m alt. on shelves on the NE side of Table Mountain in the SW Cape (Figures 2 & 3). This is not surprising, as Table Mountain, with its mild and humid winters and relatively high rainfall, offers favourable conditions for a diversified lichen vegetation. It is one of the richest lichen localities in southern Africa and is the type locality of numerous lichen species.

It is premature to speculate on the origin and dispersal of *C. chlorophylla* in the southern hemisphere and on the

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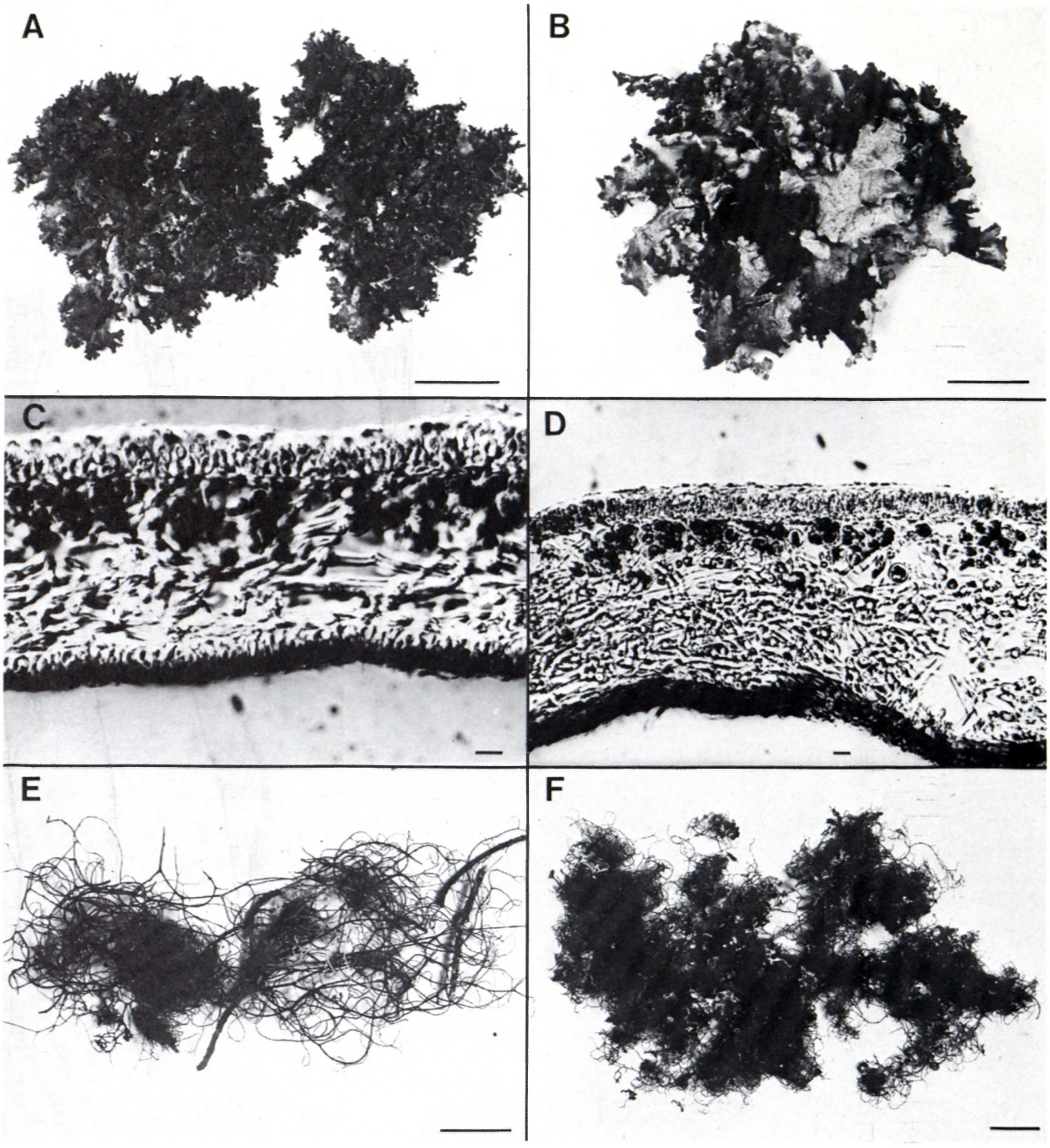

FIGURE 1.— A, *Cetraria chlorophylla, Esterhuysen 22911*, bar = 10 mm; B, *Platismatia glauca, Esterhuysen 10261*, bar = 10 mm; C, *C. chlorophylla*, cross section of thallus, interference contrast micrograph, *Esterhuysen 10261*, bar 10 μm; D, *P. glauca*, cross section of thallus, light micrograph, *Esterhuysen 10261*, bar = 10 μm; E, *Bryoria fuscescens, Esterhuysen 10261*, bar = 10 mm; F, *B. motykae, Esterhuysen 21356*, bar = 10 mm.

only record yet known from southern Africa. I am not inclined to believe, however, that the species has been introduced in modern times, as it occurs at relatively high elevations in a natural habitat (see Kärnefelt 1986). Presumably the species could occur in similar regions in southern Africa with favourable climatic conditions, such as the Drakensberg escarpment as well as at high altitudes in the east African mountains.

CAPE.—3318 (Cape Town): Table Mountain, cliffs, NE side, on shelves, 2500–3000 ft [750–900 m] (–CD), 1954, *Esterhuysen 22911* (BOL).

Platismatia glauca *(L.) Culb. & Culb.* in Contributions from the United States National Herbarium 34: 530 (1968).

Lichen glaucus L.: 1148 (1753). Type: Europe, Linnean Herbarium Sheet 1273–139 (LINN, lecto.).

Thallus foliose, loosely attached, 20–50 mm across; *lobes* 5–10 mm broad; *upper surface* yellowish, with dark brownish areas, reticulately wrinkled, with scattered marginal soralia; *lower surface* dark brown, reticulately wrinkled to pitted (Figure 1B); *ascomata* and *coni-*

diomata not observed. *Upper cortex* prosoplectenchymatous, 20–30 μm thick, composed of strongly pachydermatous cells with indistinct cell lumina; *photobiont* green, spherical, concentrated near the upper cortex; *medulla* loose, 50–100 μm thick; lower cortex similar to the upper cortex, heavily pigmented (Figure 1D). Reactions K−, C−, KC− and P−. *Platismatia glauca* contains caperatic acid and atranorin.

This well known species from the northern hemisphere has been described in detail by Culberson & Culberson (1968). *Platismatia glauca* is locally common on conifers and deciduous trees and occasionally also on rocks in western Europe and North America. It is extremely common especially in the western American states, but is found more rarely in the eastern provinces (Hale 1979; Thomson 1984). Like *C. chlorophylla*, *P. glauca* is apparently also favoured by a rather mild oceanic climate.

In the southern hemisphere *P. glauca* is also known from the south-westernmost part of South America (Culberson & Culberson 1968) and from Australia (Filson 1983), but it is so far unknown from New Zealand (Galloway 1985).

On the African continent *P. glauca* was previously known from Kenya, Tanzania and Uganda (Figure 3), where it occurs at rather high altitudes from 3 200–3 500 m (Krog & Swinscow 1975). The two new records from southern Africa were found at ± 2 400 m in the Cathedral Peak area in the Natal Drakensberg and at ± 1 800 m in the Sneeuberg in the Sederberg Mountains in the western Cape (Figure 2). The scattered montane African records may indicate that the localities represent the remnants of a much wider pre-Pleistocene distribution.

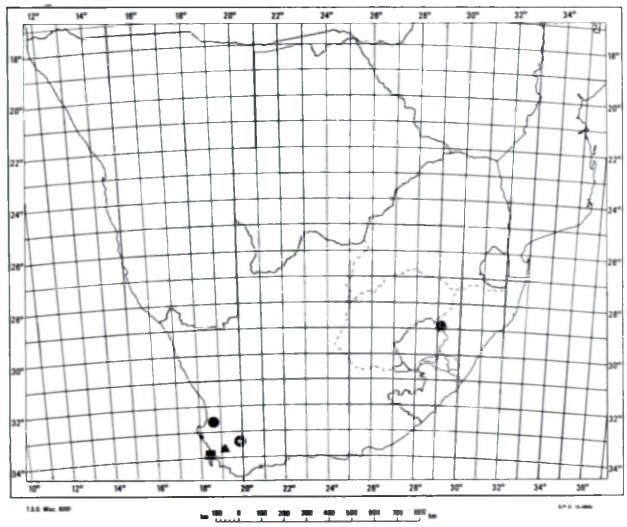

FIGURE 2.—Distribution in southern Africa of: *Cetraria chlorophylla*, ■; *Platismatia glauca*, ●; *Bryoria fuscescens*, ○; *B. motykae*, ▲.

NATAL.—2829 (Harrismith): Cathedral Peak area, tree trunk, 8000 ft [2 500 m], (–CC), 1944, *Esterhuysen 10261* (BOL).

CAPE.—3218 (Clanwilliam): Sederberg, Sneeuberg, shaded ledge on cliffs, south side, 6000 ft [1 800 m] (–DA), 1952, *Esterhuysen 20044* (BOL).

Bryoria fuscescens *(Gyeln.) Brodo & D. Hawksw.* in Opera Botanica 42: 83 (1977).

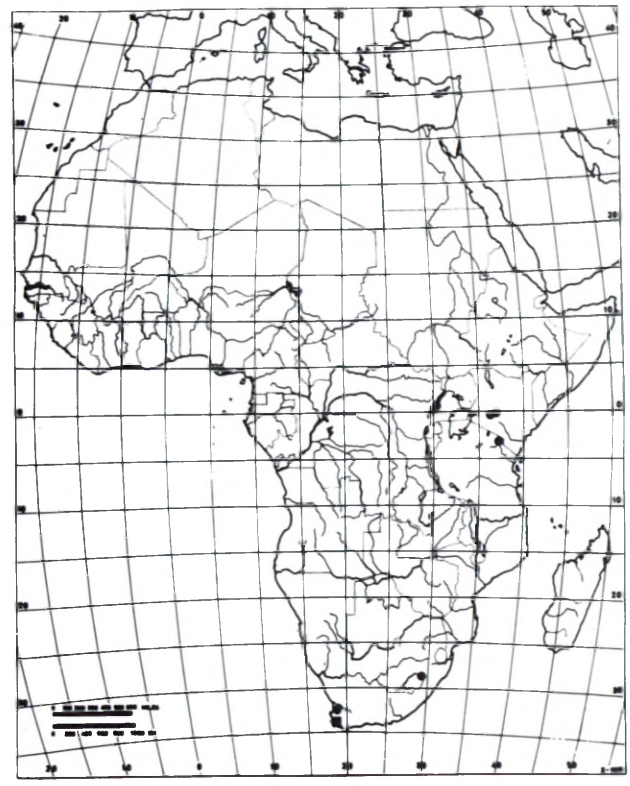

FIGURE 3.—Distribution in Africa of: *Cetraria chlorophylla*, ■; *Platismatia glauca*, ●.

Alectoria fuscescens Gyeln.: 55 (1932). Type: Finland, Tavastia austr., Hollola, ad truncos Pini locis apricioribus in silva, J. P. Norrlin, 1882, *Nyl. & Norrl., Lich. Fenn. Exs. no. 466* (BP, 33.947, lecto.).

Thallus subpendent, 30–60 mm across; *main lobes* with rather abundant short lateral branches, up to 0,3 mm wide, pale brown to blackish; with abundant fissural soralia, from rather small up to 0,5 mm wide; scattered small fissural pseudocyphellae present; *ascomata* and *conidiomata* not observed (Figure 1E). Anatomical characters similar to most other species of *Bryoria*, the cortical layer composed of periclinal hyphae. *Reactions* of medulla and particularly the soralia, K−, C−, KC− and P+. *B. fuscescens* contains fumarprotocetraric acid, clearly indicated by TLC of the examined material.

Within the genus *Bryoria*, *B. fuscescens* is one of the most difficult species to circumscribe. It is widely distributed within the boreal zone in the northern hemisphere, where it also occurs in many different habitats, frequently on trees, but also on the ground and on rocks. The known morphological and chemical variation is fairly wide and may be partly the result of different responses to the local diversified habitat selection pressures (see Brodo & Hawksworth 1977; Bystrek 1963; Hawksworth 1972; Hawksworth 1973).

The material from southern Africa was collected at ± 1 680 m altitude on twigs at Horseshoe Peak, in the Hex River Mountains in the western Cape (Figure 2). This is the first known record of a member of the genus *Bryoria* in southern Africa. The earlier records published by Doidge (1950) as *Alectoria chalybeiformis* f. *terrestris* and A. *jubata* have been re-examined and are apparently filamentous Cyanobacteria.

Apart from southern Africa, *B. fuscescens* is also known from several localities in the ericaceous zone and

in the alpine zone from 3 200 to 4 900 m altitude, in Ethiopia, Kenya, Tanzania and Uganda (Krog & Swinscow 1975). Figure 4.

CAPE.—(3319 Worcester): Hex River Mountains, Horseshoe Peak, on ledges on south side, on twigs, 5500 ft [1 680 m] (–DD), 1953, *Esterhuysen 22189* (BOL).

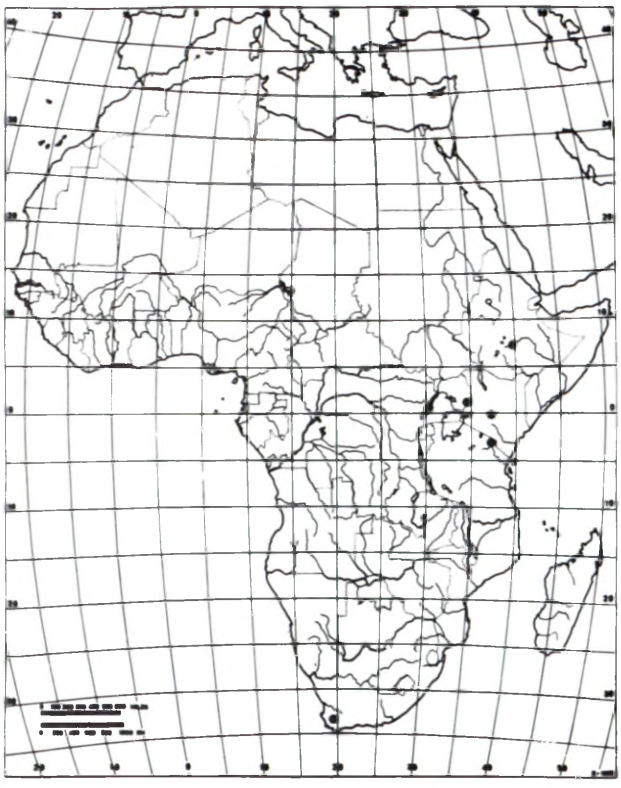

FIGURE 4.—Distribution in Africa of *Bryoria fuscescens*.

Bryoria motykae *(D. Hawksw.) Brodo & D. Hawksw.* in Opera Botanica 42: 155 (1977).

Alectoria motykae D. Hawksw. 124: 124 (1971). Type: Kenya, Mt Kenya, Teleki Valley, alpine regions, on vertical surfaces of boulders in the upper parts of the valley, alt. 4 200 m, 1948, *Hedberg 1720b* (UPS, holo.).

Thallus prostrate, 10–30 mm long; *main lobes* with arcuately curved lateral branches, dark brown or partly blackish, up to 0,2 mm wide, with scattered fissural pseudocyphellae, up to 0,5 mm broad; *ascomata* and *conidiomata* not observed. *Anatomical characters* similar to most other species of *Bryoria*, the cortical layer composed of periclinal hyphae. *Reactions* of medulla and pseudocyphellae, K−, C−, KC− and P+. *Bryoria motykae* contains fumarprotocetraric acid according to Hawksworth (1971). However, TLC gave only weak spots in the examined material, which included the type specimen kept at UPS, and the P reaction was feint as well.

Bryoria motykae is characterized by the dark brown or partly blackish main lobes with arcuately curved lateral branches, broad fissural soralia and scattered fissural pseudocyphellae. The material from southern Africa, however, differs slightly from the type material from Mount Kenya (*Hedberg 1720b*, UPS) in the absence of soralia, but corresponds in the remaining characters with the type (Figure 1F). According to Hawksworth (1971) pseudocyphellae are lacking, contrary to my observations on re-examination of the type material. Krog & Swinscow (1975) had apparently also observed pseudocyphellae, because they mention that the fissural soralia developed from minute pseudocyphellae.

Among the possibly related species, Hawksworth (1971) pointed out the resemblance to *B. furcellata* (Fr.) Brodo & D. Hawksw. (as *Alectoria nidulifera* Norrl. in Nyl.) in some characters. *B. furcellata* is, however, distinguished by the more spinulate lobes and the rather abundant isidiate soredia. *B. motykae* is also reminiscent of *B. simplicior* (Vain.) Brodo & D. Hawksw., in the structure of the soredia (Hawksworth 1971). *B. simplicior* is, however, a normally corticolous species, characterized by a typical caespitose habit and very distinctive soredia. In addition *B. simplicior* also lacks secondary compounds.

B. bicolor (Ehrh.) Brodo & D. Hawksw. is somewhat reminiscent of *B. motykae* in the similar fissural pseudocyphellae, but this species is distinguished by the rather short lateral spinules and differently coloured main lobes. Furthermore, Krog & Swinscow (1975) included *B. ruwenzoriensis* (D. Hawksw.) Brodo & D. Hawksw., recorded from east Africa, in *B. bicolor*.

In my opinion *B. motykae* is presumably associated with the *B. fuscescens* aggregate, which also occurs in the east African mountains. We have to await further studies on this difficult species complex before the status of *B. motykae* can be determined with certainty.

The material from southern Africa was collected at ± 1 300 m on sandy hollowed rock surfaces on the Groot Drakenstein Mountain near Paarl in the western Cape (Figure 2).

Apart from southern Africa, *B. motykae* is also known from Mt Kenya, where it occurs at ± 3 500 m (Figure 5). The record published by Krog & Swinscow (1975)

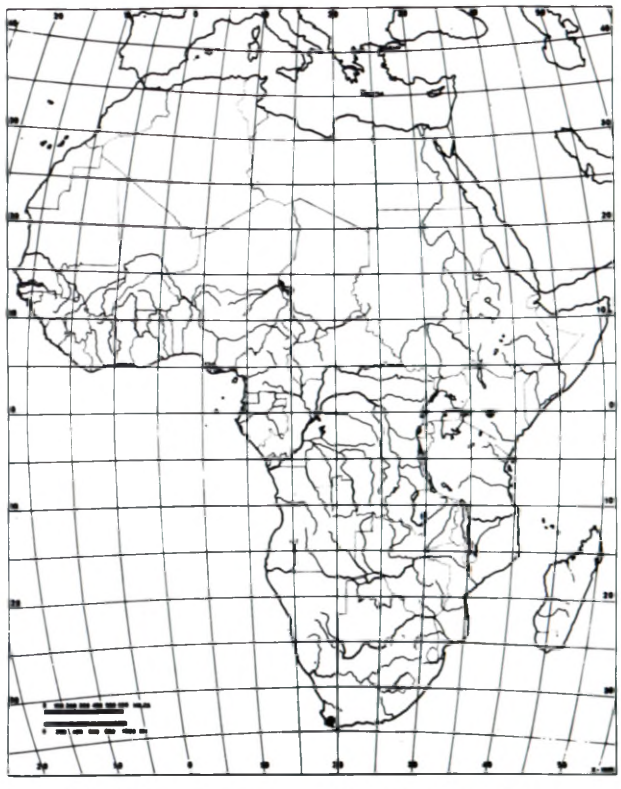

FIGURE 5.—Distribution in Africa of *Bryoria motykae*.

from Mt Kilimanjaro in Tanzania, proved after re-examination to belong to the *B. fuscescens* group.

CAPE.—3319 (Worcester): Groot Drakenstein Peak, amongst other lichens on sandy hollowed rock surfaces, 4500 ft [1 370m], (–CA), 1953, *Esterhuysen 21356* (BOL).

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