

RUST FUNGI FROM EAST AFRICA: II

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ABSTRACT. An enumeration is given of twenty rust fungi collected by Dr Nils Lundqvist in East Africa.

While collecting in upland areas of East Africa in 1970, Dr Nils Lundqvist of the Institute of Systematic Botany of the University of Uppsala, made collections of a number of rust fungi. These collections complement those of Cain, Griffin and Krug which were the subject of a previous paper (Henderson, 1970). The first set of this collection is deposited in the Uppsala herbarium and a duplicate in Edinburgh. A complete set has also been deposited in Herb. IMI. I am indebted to Dr Lundqvist for the opportunity of examining this interesting material.

ACANTHACEAE

Aecidium acanthacearum Cooke in Grevillea 10: 124 (1882).

On *Hypoestes phaylospoides* S. Moore. Kenya: Kakamega Distr., Kakamega forest, 1700 m, 20 i 1970, Lundqvist 6555.

This is certainly the same rust as I recorded previously on *H. triflora* (Henderson, 1970). It is distinctive in having almost smooth spores with large conspicuous refractive bodies.

AMARANTHACEAE

Puccinia cyathulicola Cummins var. *kenyensis* Cummins in Bull. Torr. Bot. Cl. 79: 218 (1952).

On *Cyathula* cf. *polyccephala* Bak. Tanzania: Kilimanjaro, 2400 m, 12 i 1970, Lundqvist 6394.

I have recently examined several collections of this rust from Kenya. The present collection bears only the highly characteristic uredospores.

COMPOSITAE

Aecidium elytropappi P. Henn. in Hedwigia 37: 294 (1898).

On *Stoebe kilimandsharica* O. Hoffm. Tanzania: Kilimanjaro, 2800 m, 14 i 1970, Lundqvist 6429.

The aecidia occur on turbinate swollen stems of the host. A conspicuous feature is the strongly developed cylindrical peridia. The aecidiospores are sub-spherical to angular-globose, $24-27 \times 26-30 \mu\text{m}$, with an almost smooth wall up to $2 \mu\text{m}$ thick without refractive bodies. This collection is an exact match for a specimen of the isotype of *A. elytropappi* on *Elytropappus rhinocerotis* (leg. Schlechter, Nov. 1896). The host genera *Elytropappus* and *Stoebe* are generally considered to be fairly closely related.

Aecidium macowanianum Thuem. in Flora 58: 380 (1875).

On *Conyza steudelii* Oliv. & Hiern. Tanzania: Kilimanjaro, 2000 m, 15 i 1970, *Lundqvist* 6447.

This species is undoubtedly very close to *A. conyzae-pinnatilobatae* Sydow. Careful comparison with a collection from Kenya on the same host shows that the only difference lies in the slight thickening of part of the aecidiospore wall in *A. conyzae-pinnatilobatae*. However even the Kilimanjaro collection shows slight signs of irregular wall thickening so the two species may not be absolutely distinct.

Aecidium vernoniae-podocoma Doidge in Bothalia 2: 212 (1927).

On *Vernonia subuligera* Hoffm. Tanzania: Arusha Prov., Ngurdoto National Park, 1800 m, 16 i 1970, *Lundqvist* 6470.

Aecidium vernoniae-podocoma is regarded by Bisby & Wiehe (1953) as a common rust in Southern Africa but the host range within the genus *Vernonia* requires investigation. The aecidia are rather remarkably immersed and dehisce by a pore-like aperture. The aecidiospores are verrucose over much of their surface but also show patches of larger roundish verrucae which approach the dimensions of the 'refractive granules' of many aecidia.

Puccinia africana Cooke in Grevillea 8: 71 (1879).

On *Cineraria grandiflora* Vatke. Tanzania: Kilimanjaro, 2800 m, 14 i 1970, *Lundqvist* 6431.

Telia only; teliospores $44-55 \times 14-16 \mu\text{m}$, apex to $6 \mu\text{m}$ thick, stipe up to $30 \mu\text{m}$ long, most spores leptosporic. As I discussed previously (Henderson, 1970) under *Puccinia africana*, it is very probable that microcyclic rusts of the *P. cnici-oleracei* type may have had independent origins but taking the range as a whole the numerous species are morphologically indistinguishable. I therefore prefer to place this collection within an already described African species, *P. africana*, rather than describe another species based solely on host identity.

CYPERACEAE

Puccinia conclusa Thuem. in Journ. Sci. Math. Phys. Nat. 24: 10 (1878).

On *Cyperus* sp. Kenya: Coast Prov., Tsaro National Park, 500 m, 8 i 1970, *Lundqvist* 6349.

Uredinia only, uredospores thick-walled ($2.5-3 \mu\text{m}$), verrucose with two equatorial pores. Jørstad (1956) clarified the relationship of the *Cyperus* rusts in Africa and included many species of *Cyperus* as host for *Puccinia conclusa*.

GRAMINEAE

Uromyces leptodermus Sydow in Ann. Mycol. 4: 430 (1906).

On ? *Eriochloa nubica* (Steud.) Hack. & Schweinf. Kenya: Coast Prov., Tsaro National Park, 500 m, 8 i 1970, *Lundqvist* 6351.

Uromyces leptodermus is a widespread rust on various genera and species of the Paniceae. The present collection bears only uredinia.

HYPERICACEAE

Puccinia keniensis Jørstad in Ark. Bot. 3, 17: 578 (1956).

On *Hypericum lanceolatum* Lam. Tanzania: Kilimanjaro, 2800 m, 14 i 1970, Lundqvist 6433.

This rust, relatively recently described, is now known to infect *Hypericum revolutum*, *leucoptychodes*, *quartinianum* and *keniense*.

LABIATAE

Puccinia leonotidicola P. Henn. in Bot. Ergebnisse Kunene-Sambesi Exped. 3 (1902).

On *Leonotis* cfr. *mollissima* Gürke or *rugosa* Benth. Tanzania: Kilimanjaro, 2800 m, 14 i 1970, Lundqvist 6434.

Uredinia only.

LEGUMINOSAE

Aecidium crotalariae P. Henn. in Engler, Die Pflanzenwelt Öst-Africas, Teil C, 52 (1895).

On *Crotalaria* sp. Tanzania: Kilimanjaro Prov., Kilimanjaro, 2900 m, 14 i 1970, Lundqvist 6437.

Aecidia only, which exactly match a collection on *Crotalaria agatiflora* from Kenya (Henderson, 1970).

Maravalia crotalariae Sydow in Ann. Mycol. 35: 250 (1937).

On *Crotalaria agatiflora* Schweinf. Tanzania: Kilimanjaro, 2800 m, 14 i 1970, Lundqvist 6436.

LILIACEAE

Uromyces aloes (Cooke) Magnus in Ber. Deutsch. Bot. Ges. 10: 48 (1892).

On *Aloë* sp. Kenya: Central Prov., Naro Maru River Lodge, 2000 m, 23 i 1970, Lundqvist 6623.

Uromyces aloes is well distributed in Southern Africa. It is very prominent so is often collected.

MALVACEAE

Puccinia malvacearum Mont., Hist. Fis. Polit. Chili 8: 43 (1852).

On *Malva verticillata* L. Tanzania: Kilimanjaro, 2300 m, 15 i 1970, Lundqvist 6448.

The various species of *Malva* in East Africa are all considered to be introductions.

RANUNCULACEAE

Aecidium englerianum P. Henn. in Engler's Bot. Jahrb. 41: 15 (1893).

On *Clematis hirsuta* Perr. & Guill. Tanzania: Kilimanjaro Prov., Mt Kilimanjaro, 2800 m, 14 i 1970, Lundqvist 6430a.

This specimen is an exact match for a specimen on *Clematis sinensis* collected by Volkens in 1893 on Mt Kilimanjaro. The aecidia are seated on gall-like spots, the aecidiospores lack refractive bodies and have numerous pores.

Coleosporium clematidis Barclay in Journ. As. Soc. Bengal 59: 89 (1890).

On *Clematis hirsuta* Perr. & Guill. Tanzania: Kilimanjaro Prov., Mt Kilimanjaro, 14 i 1970, *Lundqvist* 6430.

The biology of this rust was commented on in a previous paper (Henderson, 1970). The same collection bears aecidia of *Aecidium englerianum* on gall-like swellings.

RHAMNACEAE

Endophyllum macowanii Pole Evans in Rept. S. Afr. Ass. Adv. Sci. 1908: 252 (1909).

On *Rhamnus prinoides* L'Hérit. Tanzania: Mt Kilimanjaro, 2800 m, 14 i 1970, *Lundqvist* 6442.

This collection is from very near the site of that listed in my previous paper. There is no certainty of course that all the collections are indeed *Endophyllums* short of germinating fresh spores. However, without more evidence the behaviour of the sori as aecidia of a heteroecious rust perhaps of the *Puccinia coronata* affinity cannot be ruled out.

ROSACEAE

Trachyspora intrusa (Grev.) Arthur, Rust United States, Canada, 97 (1934).

On *Alchemilla johnstonii* Oliver. Kenya: Mt Kenya, 3300–3450 m, 23 i 1970, *Lundqvist* 6631.

The leaves in this collection are densely covered with uredinoid aecidia. Close examination of the detail of the echinulation of the aecidiospores shows that the echinulae are somewhat grouped so that at certain focuses the spore surface appears reticulate. European collections of *Trachyspora intrusa* tend to have more regular distribution of echinulae. However, examination of a number of African collections of *T. intrusa* on *Alchemilla cryptantha*, S Rhodesia, *Rothwell* 13469, I.M.I. 61688, on *Alchemilla gracilipes*, Tanzania, Ngorongoro Crater, *Hindorf* 52, I.M.I. 148672, on *Alchemilla* sp., Uganda, Mt Morongole, *Hansford* 2690, I.M.I. 66681 and on *Alchemilla* sp., Kenya, Thomson's Falls, *Nattrass*, I.M.I. 45151, shows that there is considerable variation in ornamentation of aecidiospores. The grouped and uniformly scattered echinulae may be present in the same collection. There is insufficient support therefore for taxonomic recognition of the African population even at a subspecific level.

UMBELLIFERAE

Puccinia hydrocotyles Cooke in Grevillea 9: 14 (1880).

On *Hydrocotyle* cfr. *sibthorpioides* Lam. Tanzania: Arusha Prov., Ngurdoto National Park, 1500 m, 16 i 1970, *Lundqvist* 6469.

As is frequent in this species, there are only uredinia in this collection. The uredospores are of the distinctive type with two equatorial pores, the wall echinulate but smooth around and especially below the pores.

VERBENACEAE

Aecidium evansii P. Henn. in Engl. Bot. Jahrb. 41: 242 (1908).

On *Lippia* cfr. *javanica* (Burm. f.) Spreng. Tanzania: Arusha Prov., Ngurdoto National Park, 15 i 1970, Lundqvist 6455.

Aecidium evansii occurs on *Lippia* spp. in Uganda, Malawi and S Africa. There is also a doubtful record of it on *Lantana mearnsii*.

FUNGUS INDEX

<i>Aecidium acanthacearum</i>	<i>Hypoestes phaylospoides</i>
— <i>crotalariae</i>	<i>Crotalaria</i> sp.
— <i>elytropappi</i>	<i>Stoebe kilimandsharica</i>
— <i>englerianum</i>	<i>Clematis hirsuta</i>
— <i>evansii</i>	<i>Lippia javanica</i>
— <i>macowanianum</i>	<i>Conyza steudellii</i>
— <i>vernoniae-podocoma</i>	<i>Vernonia subuligera</i>
<i>Coleosporium clematidis</i>	<i>Clematis hirsuta</i>
<i>Endophyllum macowanii</i>	<i>Rhamnus prinoides</i>
<i>Maravalia crotalariae</i>	<i>Crotalaria agatiflora</i>
<i>Puccinia africana</i>	<i>Cineraria grandiflora</i>
— <i>conclusa</i>	<i>Cyperus</i> sp.
— <i>cyathulicola</i> var. <i>kenyensis</i>	<i>Cyathula polycephala</i>
— <i>hydrocotyles</i>	<i>Hydrocotyle sibthorpioides</i>
— <i>keniensis</i>	<i>Hypericum lanceolatum</i>
— <i>leonotidicola</i>	<i>Leonotis mollissima</i> or <i>rugosa</i>
— <i>malvacearum</i>	<i>Malva verticillata</i>
<i>Trachyspora intrusa</i>	<i>Alchemilla johnstonii</i>
<i>Uromyces aloes</i>	<i>Aloë</i> sp.
— <i>leptodermus</i>	<i>Eriochloa nubica</i>

HOST INDEX

<i>Alchemilla johnstonii</i>	<i>Trachyspora intrusa</i>
<i>Aloë</i> sp.	<i>Uromyces aloes</i>
<i>Cineraria grandiflora</i>	<i>Puccinia africana</i>
<i>Clematis hirsuta</i>	<i>Aecidium englerianum</i>
— —	<i>Coleosporium clematidis</i>
<i>Conyza steudellii</i>	<i>Aecidium macowanianum</i>
<i>Crotalaria agatiflora</i>	<i>Maravalia crotalariae</i>
— sp.	<i>Aecidium crotalariae</i>
<i>Cyathula polycephala</i>	<i>Puccinia cyathulicola</i> var. <i>kenyensis</i>
<i>Cyperus</i> sp.	— <i>conclusa</i>
<i>Eriochloa nubica</i>	<i>Uromyces leptodermus</i>
<i>Hydrocotyle sibthorpioides</i>	<i>Puccinia hydrocotyles</i>
<i>Hypericum lanceolatum</i>	— <i>keniensis</i>
<i>Hypoestes phaylospoides</i>	<i>Aecidium acanthacearum</i>
<i>Leonotis mollissima</i> or <i>rugosa</i>	<i>Puccinia leonotidicola</i>
<i>Lippia javanica</i>	<i>Aecidium evansii</i>
<i>Malva verticillata</i>	<i>Puccinia malvacearum</i>
<i>Rhamnus prinoides</i>	<i>Endophyllum macowanii</i>
<i>Stoebe kilimandsharica</i>	<i>Aecidium elytropappi</i>
<i>Vernonia subuligera</i>	— <i>vernoniae-podocoma</i>

REFERENCES

- BISBY, G. R. & WIEHE, P. (1953). The Rusts of Nyasaland. *Mycological Papers CMI*, 54.
- HENDERSON, D. M. (1970). Rust Fungi from East Africa. *Notes R.B.G. Edinb.* 30: 395-407.
- JØRSTAD, I. (1956). Reliquiae Lagerheimianae. *Ark. Bot.* 3, 17: 563-598.