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# ADDITIONS TO THE RUST FLORA OF ETHIOPIA

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RESUMEN

Se da una lista de 19 royas de Etiopía que comprende: 2 *Aecidium*, 1 *Coleosporium*, 1 *Melampsora*, 1 *Phragmidium*, 12 *Puccinia*, 1 *Ravenelia* y 1 *Uromyces*, de los cuales 7 constituyen nuevos taxones para dicha flora, principalmente de la provincia de Shoa. Siete hospedantes son nuevos para sus respectivas especies de royas, mientras que cinco lo son para sus royas en Etiopía. Es ésta la primera vez que se cita una roya sobre *Mikaniopsis*.

Most of the material presented in this paper was collected during a short visit in the end of November 1970 to the Wondo Gennet Agricultural and Handicraft School in the Shoa Province in Ethiopia. The locality is situated about 250 km S of Addis Ababa and c. 1800 m above sea level. When examining a small herbarium at the school, I found two sheets with plants infested with rusts. Later university lecturer Leif Ryvarden, Botanical Laboratory, University of Oslo, collected a few speciemens with rusts which he kindly sent me for identification. The identification of the host plants has been made by university lecturer K. A. Lye, the Norwegian Agricultural University, As-NLH, and by Dr. Ib Friis, Institute of Systematic Botany, Copenhagen. One host plant has been identified in Kew.

For comparison I have borrowed material from Kew, IMI and from the Botanical Museum of Oslo University.

If nothing else has been stated, the specimens listed have been collected by the author, and the material is preserved in the herbarium of NPPI.

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**Aecidium englerianum** P. Henn. & Lindau. Engler Bot. Jahrb. 17:15, 1893.

On *Clematis hirsuta* Perr. & Guill.

Arussi Prov., Asella, W slope of Mt. Chilalu, c. 2500-2800 m, 6 I 1973, leg. L. Ryvarden (Nº 8660, herb. O).

This gallforming aecidium which is widespread on *Clematis* spp. in Africa, has been reported several times also from Ethiopia, e.g. by Castellani and Ciferri (1937) on *Clematis* sp., and by Ciccarone (1940) on *C. wightiana* Wall. var. *glaucescens* Fres. On *C. hirsuta*, which might be a new host for this rust in Ethiopia, it has been recorded in Kenya, Tanzania, and Zambia.

In the same specimen, uredinia of *Coleosporium clematidis* Barcl. occur.

**Aecidium rosea-abyssinicae** P. Henn. Engler Bot. Jahrb. 17: 17, 1893.

On *Rosa abyssinica* R. Br.

Arussi Prov., Asella, W slope of Mt. Chilalu, c. 2500-2800 m, 6 I 1973, leg. L. Ryvarden (Nº 8658, herb. O).

This species is, as already pointed out by Sydow (1924), no aecidium, but a caeoma, described from Eritrea. Later Stewart & Yirgou (1967) reported it from Shoa Prov. on the same host.

Hennings (op. cit.) mentioned the similiarity with the "Aecidium" of *Phragmidium tuberculatum* J. Müll, and stressed the size of the sori, their colour, and especially the paraphyses which were "gerade, nicht nach einwärts gekrümmt". In the present material the paraphyses measured 27-35 × 5.5-9 µm, they were more straight than those in a caeoma stage of *Ph. tuberculatum* on Rosa *canina* L. (herb. NPPI) where they measured 40-80 × 9-18 µm. The walls of the paraphyses were in both species about 1 µm thick, but when they in *Ph. tuberculatum* were not thickened at the apex, they were up to 3.5 µm thick at the apex in those from A. *rosae-abyssinicae*, sometimes also on the dorsal wall when the paraphyses were curved.

**Coleosporium clematidis** Barcl. J. Asiat. Soc. Bengal 59, II: 89, 1890.

Syn. *Caeoma clematidis* Thuem. Mycoth. Univ. Nº 539, 1876.

Arussi Prov., Asella, W slope of Mt. Chilalu, c. 2500-2800 m, 6 I 1973, leg. L. Ryvardeen (Nº 8660, herb. O).

This rust which occurs on several *Clematis* spp. from East and South Africa to China and Japan, has previously been recorded from Eritrea by Hennings (1893). On *Cl. hirsuta* it has been reported from Kenya and Tanzania.

**Melampsora euphorbiae** (Schub.) Cast. Obs. Pl. Acotyl. 2: 18, 1843.
Syn. *M. helioscopiae* Wint. in Rabh. Krypt.-Fl., Ed. 2, I, 1:240, 1882.

On *Euphorbia depauperata* A. Rich.
Shoa Prov., Wondo Gennet; II.
Arussi Prov., Asella, 12-IV-1965, leg. H. Hovda; II.

*M. euphorbiae* has been recorded on a large number of *Euphorbia* spp. in Africa. Castellani & Ciferri (1937) reported it as *M. helioscopiae* on *E. monticola* Hochst. from Eritrea and later (Castellani & Ciferri 1950) on *E. schimperiana* Scheele from Sidamo. Stewart & Yirgou (1967) reported it on *E. heterophylla* L. from Harar. *E. depauperata*, which is a new host for this rust species in Ethiopia, has previously been recorded as a host in Malawi (Bisby & Wiehe 1953).

**Phragmidium tuberculatum** J. Müll. Ber. Deutsch. Bot. Ges. 3: 391, 1895.

On *Rosa* sp. cult.
Addis Ababa; II+III.

This rust which is widespread in Europe and Asia, and which is also reported from the Americas and New Zealand, seems to be rare on the African continent. Maire & Werner (1937) recorded it on *R. sicula* Trott in Marocco, and Nattrass (1961) brought a record of it on *Rosa* sp. from Kenya. Stewart & Yirgou (1967) reported an *Uredo* sp. on *R. abyssinica* from Kaffa and Harar Provinces in Ethiopia. They indicated that this uredo stage might belong to *Ph. tuberculatum*.

**Puccinia africana** Cke. Grevillea 8: 71, 1879.

On *Spilanthes mauritiana* (A. Rich. ex Pur.) DC.
Shoa Prov., Wondo Gennet; III.

Jorstad (1956) reported this rust species on *S. acmella* L. (= *Blainvillea acmella* (L.) Philip.) from Adoa. It is known on this host from several localities in East Africa, and also from Madagascar. Other hosts are *S. africana* DC. and *Cineraria grandiflora* Vatke. *S. mauritiana* is a new host for this rust in Ethiopia.

Henderson (1970, 1972) has discussed this rust species which is of *P. cnici-oleracei* type.

**Puccinia arthraxonis-ciliaris** Cumm. Uredineana 4: 16, 1953.
Syn. *Uredo arthraxonis-ciliaris* P. Henn. Hedwigia 47: 251, 1908.

On *Arthraxon quartinianus* (A. Rich.) Nash.

Shoa Prov., Wondo Gennet; II.

This rust has not been reported earlier from Ethiopia. It is known to occur on the same host in Uganda and the Philippines, and on

other *Arthraxon* spp. from many localities in Asia, and also from Mauritius and New Guinea.

**Puccinia cnici-oleracei** Pers. ex Desm. Cat. Pl. Omis. p. 24, 1823.

On *Carduus nyassanus* (S. Moore) R. E. Fries.
Shoa Prov., Wondo Gennet; III.
On *Mikaniopsis clematoides* (A. Rich.) Milne-Redh.
Shoa Prov., Wondo Gennet; III.
Arussi Prov., Asella, W slope of Mt. Chilalu, c. 2500-2800 m, 6 I 1973, leg. L. Ryvarden (Nº 8656, herb. O); III.

The microcylic *P. cnici-oleracei* is a cosmopolitan rust species including a number of lepto-forms often described as species, but which are separated more by hosts than on morphological characters (cf. Jorstad 1932).

In Africa this species has been reported on *Centaurea* spp. in Egypt, Tunis, and Algerie, on *Carthamus lanatus* L. in Tunis, and on *Carduus* spp. On the latter host genus occurrence of *P. cnici-oleracei* are rare. The only records known to me are those of Buhr (1958) who reported it on *C. crispus* L. from France; Wakefield & Hansford (1949) on *Carduus* sp. in Uganda, Nattrass (1961) on *C. kikuyorum* R. E. Fries in Kenya, and Stewart & Yirgou (1967) on *Carduus* sp. from the Kaffe Prov. in Ethiopia. *C. nyassanus* is a new host for this rust species.

On *Mikaniopsis* spp. I have seen no record of rusts. The teliospores in the two specimens examined measured 36-46 × 14-20 µm with

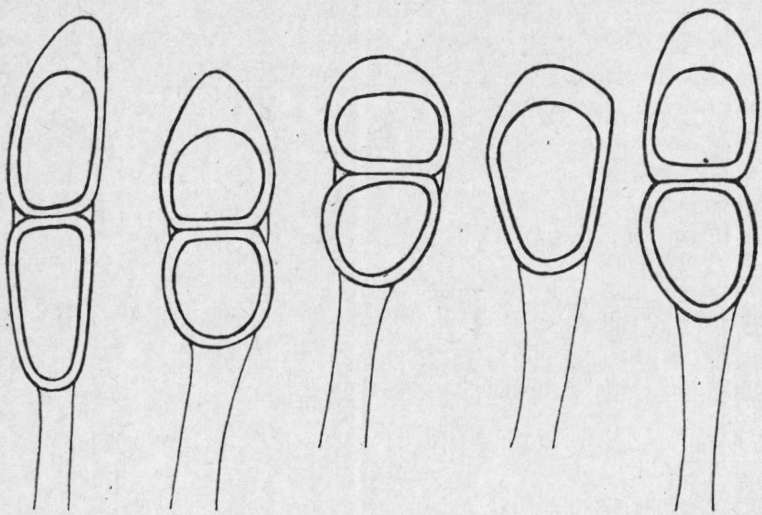

Fig. 1. — *Puccinia cnici-oleracei* on *Mikaniospsis clematoides*.

an apex thickened up to 8 μm (Fig. 1). *M. clematoides* is common in Ethiopia and occurs also in the tropical East-Africa.

**Puccinia cyperi-tagetiformis** Kern. Mycologia 11: 138, 1919.

On *Cyperus longus* L.
Shoa Prov., Wondo Gennet; II+III.

This species which is new to the rust flora of Ethiopia, has a wide distribution, in the Americas from Texas to Peru and Brazil, on several islands in the Caribbean Sea, in Bermudas, and in Africa and Asia. The host seems to be new to this species.

Doidge (1927) described var. *africana* which she (Doidge 1939) gave species rank and named it *P. pegleriana*. Later Bouriquet & Bassino (1965) described var. *madagascariensis*. Both varieties were based on larger teliospores than had the main species. If nothing else can be used for distinguishing these three taxa, it seems difficult to keep them separate, at least the two varieties, var. *africana* (=*P. pegleriana*) and var. *madagascariensis* are identical, and of which the former name has priority. The measurements given from the African specimens indicate that they all should be included in one species (Tab. 1).

TABLA 1. *Spore sizes in* μm.

| | II | II |
|---|---|---|
| *P. cyperi-tagetiformis* (type) | 19-26 x 15-21 | 31-48 x 14-18 |
| var. *africana* (type) | 20-24 x 15-21 | 30-60 x 16-23 |
| var. *madagascariensis* (type) | 20.5-31 x 16.5-24.5 | 43-64 x 13-22 |
| *P. cyperi-tagetiformis* (from Guinea)* | 17-28 x 15-20 | 35-53 x 12-20 |
| (from Ethiopia) | 23.5-31.5 x 18-21 | 39-51 x 15-16.5 |

* Viennot-Bourgin (1959).

**Puccinia guizotiae** Cumm. Bull. Torrey bot. Club 79: 221, 1952.

On *Guizotia abyssinica* (L.f.) Cass.
Shoa Prov., Wondo Gennet; III.

Jorstad (1956) reported this species on *G. schultzii* Hochst from Ethiopia. On its type host, *G. scabra* Chiov. it has been recorded in Uganda, Kenya, and Sudan.

*G. abyssinica* is a new host for this rust species.

**Puccinia kalchbrenneri** de Toni var. **kalchbrenneri.** Syll. VII: 645, 1888.
Syn. *P. helichrysi* Kalch. & Cke. non Rabh. Grevillea 9: 21, 1880. *Uredo lepisclinis* Thuem. Mycoth. Univ. N° 1644, 1887.

On *Helichrysum* sp.
Shoa Prov., Wondo Gennet; II+III.

This rust has not previously been recorded in Ethiopia. In Africa it has been reported on several *Helichrysum* spp. from Uganda to South Africa. Ramakrishnan et al. (1953) have brought a record of it from India.

Doidge (1927) has described var. *valida* with teliospores which are longer and more thickened at the apex than has the var. *kalchbrenneri.* In the material examined by me, the teliospores measure 48-71 × 19-26 µm with their apex thickened up to 8 µm, matching well with the var. *kalchbrenneri.*

**Puccinia leptosperma** Syd. Monogr. Ured. 1: 557, 1903.
On *Drymaria cordata* (L.) Roem. & Schultes.
Shoa Prov., Wondo Gennet; III.

This rust which seems to be a new member of the Ethiopian rust flora, has previously been reported from Kamerun, Zaire, Uganda, South Africa, and Madagascar. *D. cordata* is the only host known for this rust.

**Puccinia leycadis** Syd. Monogr. Ured. 1: 281, 1903.
Syn. *Uredo leucadis* Syd. Hedwigia 38: 132, 1899.

On *Leucas calystachys* Oliv.
Shoa Prov., Wondo Gennet; II.

This species seems to be new to the Ethiopian rust flora. It has been reported on the same host in Uganda (Wakefield & Hansford 1949), but it has a wide distribution on its type host, *L. martinicensis* (Jacq.) R. Br., reported from Sudan to South Africa, and also from San Domingo and India. Other African hosts are *L. glabrata* R. Br. and *L. masaiensis* Baker. In India it occurs on several other *Leucas* spp. among them *L. ciliata* Spr. on which it also has been recorded on China.

**Puccinia menthae** Pers. Syn. Meth. Fung. p. 227, 1801.

On *Satureja paradoxa* (Vatke) Engl.
Shoa Prov., Wondo Gennet; II.

In Africa this rust has been recorded on several lamiaceous host genera, esp. in North Africa, but also in East and South Africa. Hennings (1891, 1893) and later Jorstad (1956) have reported it on *Mentha longifolia* L. (syn. *M. silvestris* L.) from Eritrea. *S. paradoxa* seems to be a new host for this rust.

**Puccinia ocimi** Doidge. Bothalia 2, la: 78, 203, 1927.
Syn. *Aecidium ocimi* P. Henn. Bull. Herb. Boiss. 1: 112, 1893.

On *Ocimum* cf. *suave* Willd.
Shoa Prov., Wondo Gennet; I + III, III.

Castellani & Ciferri (1937) reported *Aecidium ocimi* on *O. gratissimum* L. and *O. filamentosum* Forsk. from Eritrea, and Stewart & Yirgou (1967) reported *P. ocimi* from the Illubabor Province. The two specimens collected by me consist of young plants which may well belong to the very closely related *O. gratissimum*. *P. ocimi* is widespread in Africa, also on *O. suave*, and it is also reported from India.

The aeciospores in one of the specimens presented here match well with the drawings made by Viennot-Bourgin (1964) of aeciospores from the Comores. In his paper he indicated that *A. ocimi* (= *P. ocimi*) and *A. leiocarpum* Syd. might be conspecific, but only a study of the type specimens of the two aecial stages in question will solve this problem.

**Puccinia polygoni-amphibii** Pers. Syn. Meth. Fung. p. 227, 1801.

On *Polygonum setosulum* A. Rich.
Shoa Prov., Wondo Gennet; II.

This rust which has been reported on many species of *Polygonum* and *Oxygonum* in Africa, has been reported by Stewart & Yirgou (1967) on *O. sinuatum* Dammer in Harar Province. *P. setosulum* seems to be a new host for this rust species.

**Puccinia thunbergiae - alatae** P. Henn. in A. Engler: Die Pflanzenwelt Ostafricas p. 50, 1895.

On *Thunbergia alata* Sims.
Shoa Prov., Wondo Gennet; II.

This rust is new to the Ethiopian flora. Previously it is known from Kenya, Uganda, Tanzania, and Malawi. Other hosts are *T. subalata* Lindau and *T. crispa* Burhill.

**Ravenelia maranguensis** Cumm. Bull. Torrey bot. Club 87: 40, 1960.
Syn. *R. maranguensis* (P. Henn.). Cumm. Ibid. 72: 215, 1945 (nom. nud.).
*Uredo maranguensis* P. Henn. in A. Engler: Die Pflanzenwelt Ost-Africas und der Nachbargebiete, Teil C: 51, 1895.

On *Indigofera spicata* Forsk.
Shoa Prov., Wondo Gennet; II + III.

In the description the marginal spores in the telial heads is said to bear 1-6, usually 1-3 papillate tubercles each. Some of the marginal

spores in the specimen presented here have one tubercle. I have compared the telial heads with heads from the type of the species and with material of *R. laevis* Diet. & Holw. and *R. laevioides* Arth. & Cumm. (all herb. IMI). As the two latter species have marginal spores in their heads totally lacking tubercles, and the colour of the heads and the size of the uredineal paraphyses correspond to those in *R. maranguensis*, I prefer to place the Ethiopian specimen here.

This rust species has previously been reported from Uganda and Tanzania on *I. arrecta* A. Rich., in Uganda also on *Indigofera* sp. *I. spicata* is a new host for this rust species which is new to the flora of Ethiopia.

**Uromyces dianthi** (Pers.) Niessl. Verh. Nat. Ver. Brunn 10: 162, 1872.
Syn. *U. caryophyllinus* Wint. Rabh. Krypt. Fl. Ed. 2, 1: 149, 1882.

On *Dianthus caryophyllus L.*
Addis Ababa: II.

The carnation rust, widespread on the host species mentioned above, has been recorded by Castellani and Ciferri (1937) from Eritrea.

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