

SOUTH AFRICAN RUST FUNGI.

By E. M. Doidge.

Part V.

Aecidium Barleriae Doidge nov. spec.

Aecidia hypophylla, in epiphyllis decolorationes sat conspicuas indeterminatas brunneas efficientes, in greges plus minus orbiculares usque 3 mm. diam. metientes disposita, cupulata, 200–250 μ diam.; peridio diutius vesiculoso-clauso, tandem late aperto et cupulato, margine albido, erecto vel parum recurvato, integro v. irregulariter inciso; cellulis peridii firme conjunctis rhomboideis v. oblongis, 30–42 \times 17.5–22.5 μ , pariete exteriore striato, 6–8 μ crasso, interiore dense verrucoso, 3–4 μ crasso. Aecidiosporae angulato-globosae vel oblongae, 22.5–30 \times 17.5–20 μ , dense sed subtilissime verrucosae, membrana hyalina 1–1.5 μ crassa.

Hab. in foliis *Barleriae crassae* C.B.C1, Concession, Rhodesia, leg. Hopkins (Rh. 3684), 33423.

The aecidia are on poorly defined leaf spots, which are at first purplish-brown on the upper side of the leaf; later they become light brown and dry in the centre immediately opposite the aecidia, but still retain a purplish-brown margin.

Aecidium benguellense Lager.

in Bol. da Soc. Brot. VII (1889) p. 134; Syd. Monogr. Ured. IV (1925) p. 89.

Spermogonia amphigenous, fairly numerous, in rather close groups, 80–120 μ diam., at first honey-yellow, then brown and finally black.

Aecidia hypophyllous, on reddish-brown leaf spots, in round groups 1–2 cm. diam., arranged in circles, cupulate, 200–300 μ diam. Margin of the peridium white, revolute, lacinate; cells of the peridium firmly united, imbricate, rhomboid or irregularly angular, 35–40 μ long, 20–25 μ broad, outer wall striate, 6–8 μ thick, inner verrucose, 4–6 μ thick. Spores angular globose, ellipsoid or oblong, closely and minutely verrucose, subhyaline, 23–28 \times 17–23 μ ; epispore 1 μ thick, always thicker at the apex (3–8 μ).

on leaves of *Temnocalyx obovatus* Robyns, Concession, Hopkins (Rh. 3682), 33424.

Aecidium benguellense was originally described on leaves of *Stephanostigma fuchsoides* Welw., from Lake Ivantála, Huilla, where it was collected by Welwitsch. This plant is now known as *Temnocalyx fuchsoides* (Welw.) Robyns.

Aecidium Diospyri A. L. Sm.

in London Journ. of Bot. XXXVI (1898) p. 178; Syd. Monogr. Ured. IV (1924) p. 144.

Aecidium atro-album P. Hennings in Bot. Ergebnisse der Kunene-Sambesi Exped. (1903) p. 162.

Spermogonia epiphyllous, closely crowded, shiny black, 180–220 μ diam.

Aecidia on yellow or yellow-brown leaf spots, which become blackish-brown and finally pale or whitish-brown in the centre with a blackish border. *Aecidia hypophyllous* in round groups 1–3 mm. diam., closely crowded, briefly cylindrical, ca. 200 μ diam.; the ruptured and blackened epidermis is persistent and surrounds the aecidium like a wall. Margin of the peridium white, revolute, denticulate; cells of the peridium firmly joined together; imbricate, pentagonal to hexagonal, 24–30 \times 17–20 μ , the upper part densely verrucose,

outer wall 4–5 μ thick, inner 3–4 μ thick. Spores globose, subglobose, angular or ellipsoid, closely and minutely verruculose, subhyaline, 17–22 \times 16–18 μ ; epispore ca. 1 μ thick.

on leaves of *Diospyros mespiliformis* Hochst., Hippo Pool, Kruger National Park, Liebenberg, 32729.

The type was collected by Welwitsch in Angola on the same host; the same fungus, collected by Baum on the Kunene River, was described by Hennings (l.c.) under the name *Aecidium atro-album*.

***Aecidium Dipcadi-viridis* Doidge nov. spec.**

Aecidia hypophylla in greges ellipticos v. subrotundatos 6–15 mm. longos dense congesta, circinatim disposita, profunde immersa, 150–220 μ diam; peridio diutius vesiculo-clauso, tandem cylindraceo, usque 500 μ longo, margine albo, leniter recurvato, inciso; cellulis peridii firme conjunctis, irregulariter polygonalibus, saepius quadraticis, imbricatis, 22·5–40 \times 20–25 μ , pariete exteriori striato 7·5–10 μ crasso, interiore verrucoso, 4–5 μ crasso. Aecidiosporae angulato-globosae, ovatae v. oblongae, hyalinae v. subhyalinae, minute verruculosae, 21–26 \times 17·5–20 μ , membrana ca. 1·5 μ crassa.

Hab. in foliis *Dipcadi viridis* Moench., Mamathes, Basutoland, leg. Hean, 33136.

This aecidium often causes some hypertrophy of the host tissues; it differs from *Aecidium Dipcadi* Har. and Fat., described on *Dipcadi ndellansis* from Central Africa.

***Aecidium heliotropicolum* Talbot nov. spec.**

Aecidia foliicola, caulicola et calycicola, in foliis amphigena, cylindracea circa 1 mm. longa, 300–500 μ diam., albida v. pallide mellea, margine revoluta lacerato, in greges grandes inaequaliter disposita; cellulis peridii firme conjunctis, imbricatis, aut subglobosis aut quadraticis vel polygonis, 14–20 \times 17–26 μ , pariete exteriori striato, ca. 4 μ crasso, interiore verrucoso et striato 1·5–2·8 μ . Aecidiosporae subhyalinae vel melleae, oblongae polygonales v. angulato-subglobosae, 11–15 \times 17–23 μ ; episporio dense minuteque verruculoso, 1–1·5 μ crasso.

Hab. in foliis, caulibus et calycibus *Heliotropii Nelsoni*, in regione Potchefstroom, leg. W. J. Louw, 35016.

Aecidia on leaves, stems and calyces, amphigenous on leaves, cylindrical, up to 1 mm. long and 300–500 μ diameter, densely aggregated in large irregular groups commencing as discrete, subepidermal, yellowish-green spots, more or less obscured by the epidermal hairs. Peridium white to very pale yellow, when young closed at the apex, later opening with a lacerate, somewhat revolute margin, easily breaking off and leaving a shallow basin partly embedded in the host tissue. Peridial cells compact, firmly joined together, imbricate, occasionally subglobose, usually irregularly quadratic or polygonal, 14–20 \times 17–26 μ ; outer wall striated, about 4 μ thick; inner wall striated, verrucose, 1·5–2·8 μ thick. Aecidiospores subhyaline, 11–15 \times 17–23 μ ; epispore very finely verrucose, 1–1·5 μ thick.

on *Heliotropium Nelsoni* Wright, Potchefstroom District, 18.12.44, W. J. Louw, 35016.

***Aecidium incertum* Syd.**

in Hedwigia XL (1901) p. (1).

The type specimen of this rust (Thuem. Myc. Univ. No. 1118) collected by MacOwan, is said to be on *Senecio napifolius* Schrad. (= *S. erucifolius* Linn.) which occurs in Europe and northern Asia. The material available for examination is sparse, but the host of the type collection is not *S. napifolius* nor does it appear to be an introduced weed. It is probably an indigenous species near *S. hastulatus* Linn.

Aecidium kakelense P. Henn.

in Bot. Ergebnisse der Kunene-Sambesi Exped. (1903) p. 161 ; Syd. Monogr. Ured. IV (1924) p. 189.

Spermogonia sometimes present, not numerous, hypophyllous, interspersed with the aecidia, honey-yellow, 100–125 μ diam.

Aecidia hypophyllous, infected leaves showing a reddish discolouration on the upper surface and remaining expanded when normal leaves are revolute. *Aecidia* distributed closely and evenly over the whole leaf surface, cylindrical, 400–700 μ long, 250–350 μ diam. Margin of the peridium white, slightly re-curved, and becoming lacerate; cells of the peridium firmly connected, sub-rhomboid, 22–30 \times 18–24 μ ; outer wall conspicuously striate, 6–8 μ thick, inner closely verrucose, ca. 3 μ thick. Spores angular globose, ovate or ellipsoid, densely and minutely verruculose, 18–24 \times 16–20 μ ; epispore 1.5 μ thick.

on *Euphorbia natalensis* Bernh., on leaves, Lidgetton, Mogg, 17034.

Euphorbia striata Thunb., Mooi River, Mogg, 11797.

Euphorbia sp., near *Eu. cyparissioides* Pax, Rusapi (Rh. 4292) 33426; Marandellas, Hopkins (Rh. 4822) 33428.

Aecidium kakelense was originally described by Hennings on a *Euphorbia* species "cum foliis minutis ca. 1 cm. longis", collected by Baum near Kakele in South West Africa. The hosts listed above belong to the same group of *Euphorbia* spp.

Aecidium Nestlerae Doidge nov. spec.

Aecidia ramicola et foliicola, per ramulis leniter incrassatis irregulariter laxequae distributa, in foliis vix incrassatis amphigena, aurantiaca, 250–350 μ diam; peridio diutius vesiculoso-clauso, tandem cylindraceo, usque 750 μ longo, aperto, margine erecto vix lacerato; cellulis peridii firme conjunctis, imbricatis, rhomboideis v. irregularibus, 20–30 \times 12.5–20 μ , pariete exteriori striato, 10–12.5 μ crasso, interiore verrucoso, 3–4 μ crasso, Aecidio-sporae aurantiacae, angulato-globosae, 17.5–25 \times 15–20 μ , subleves, membrana hyalina ubique 1.25–1.5 μ crassa.

Hab. in ramulis foliisque *Nestlerae confertae* DC., Kafferfontein, Fauresmith, leg. P. Kies, 34096.

Aecidium Pentziae-globosae Doidge nov. spec.

Aecidia ramicola, pallide ochracea, per ramos juniores irregulariter et densiuscule distributa, matricem deformantia, 200–250 μ diam.; peridio diutius vesiculo-clauso, tandem cylindraceo usque 1 mm. longo, margine albo leniter recurvato, plus minus inciso; cellulis peridii firme conjunctis, subimbricatis, subrhomboideis v. oblongis, 25–40 \times 15–22.5 μ , pariete exteriori striato, 10–12.5 μ crasso, interiore verrucoso, 4–5 μ crasso. Aecidio-sporae hyalinae v. subhyalinae, ovatae, oblongae v. irregulariter angulatae, 19–30 \times 14–17.5 μ , minute denseque verruculosae, membrana 1–1.5 μ crassa, saepius ad apicem leniter incrassata (usque 4 μ).

Hab. in ramulis *Pentziae globosae* Less., prope Windsorton, leg. Acocks, 30661.

The fungus attacks the young shoots, which become thickened and branch abnormally, causing a tufted "witches' broom" effect.

Aecidium spinicolum Doidge nov. spec.

Aecidia in spinis tantum evoluta, eos deformantia et gallas irregulares formantia, totam superficiem gallarum obtegentia, profunde immersa, vix vel parum exserta, 350–500 μ diam., margine albido non vel vix recurvato, leniter inciso; cellulis peridii firme conjunctis quoad formam valde variabilis, irregulariter angulatis, 25–40 \times 12.5–22.5 μ , pariete exteriori striato, 7.5–10 μ crasso, interiore verrucoso, 3–4 μ crasso. Aecidiosporae irregulares plerumque ovatae v. ellipsoideae saepe angulatae, ad apicem interdum mucrona-

tae, dense minuteque verruculosae, hyalinae v. subhyalinae, $20-34 \times 15-22.5 \mu$; episporio ca. 1.5μ crasso, ad apicem saepe leniter incrassato, $2.5-3 \mu$ rarius usque 4μ .

Hab. in spinis *Acaciae* sp. (= *A. Karroo*) Weenen, leg. Pentz, 30923.

This fungus appears to attack only the spines of the host, which in the specimen examined are up to 11 cm. long. It often forms comparatively small, elongated tumours, 1-3.5 cm. long, but occasionally almost the whole of the spine is involved, the gall being up to 14 mm. diam. and the spine deformed.

Aecidium spinicolum appears, ex description, to be closely related to *Ae. immersum* P. Henn., occurring on *Acacia abyssinica* in Erythraea, but the latter species occurs on young branches and has thicker-walled spores, more decidedly thickened at the apex; no mucro is mentioned.

Cronartium Zizyphi Syd. and Butl.

in Ann. Myc. X (1912) p. 268; Syd. Monogr. Ured. III (1915) p. 579.

Uredo Zizyphi Pat., in Bull. Soc. Myc. Fr. XII (1896) p. 135.

Uredo-sori hypophyllous, scattered or in groups, not on leaf spots, but causing some indefinite discolouration of the leaf tissues, round to irregular, minute, punctiform or up to 0.3 mm. diam., light cinnamon-brown. Paraphyses very numerous, more or less incurved, clavate, golden-brown, often rather gnarled and irregularly curved and bent, $35-70 \mu$ long, $8-14 \mu$ broad; at the base and on the concave side thin-walled, wall about 1μ thick; at the apex and on the convex side, wall $4-5 \mu$ or occasionally up to 6μ thick. Uredospores sometimes few in number, the sorus consisting mainly of paraphyses, mostly ovate or ellipsoid, less frequently subglobose, yellow-brown, moderately echinulate, $19-33 \times 15-21 \mu$, episporio ca. 1.5μ thick; germ pores obscure.

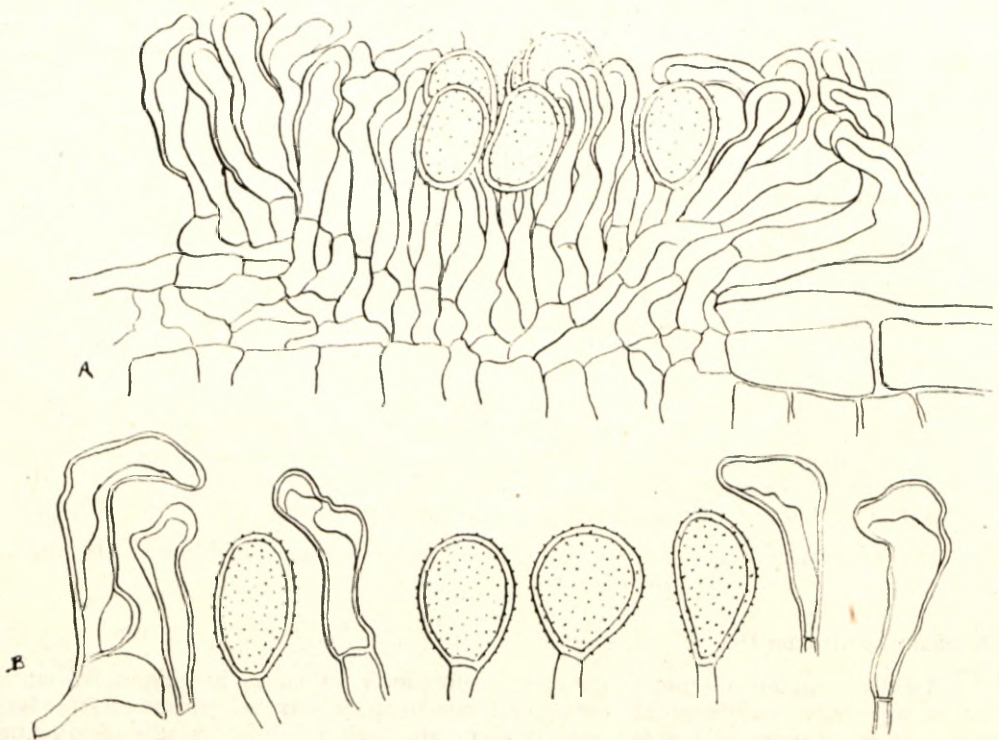


Fig. 1.—*Cronartium Zizyphi*;
(a) Section through uredo-sorus.
(b) Individual uredospores and paraphyses.

(Teleuto-sori arising from the centre of the uredo-sorus, filiform, straight or slightly curved, rusty-brown, 1.5–2.5 mm. long, 35–70 μ thick. Teleutospores cylindrical, smooth, yellow, 40–50 \times 8–11 μ ; epispore 1 μ thick.)

on *Zizyphus mucronata* Willd., on leaves, between Acornhoek and Tzaneen, *Liebenberg* 3608, 32724.

Only the uredo form is present on the specimen quoted, the description of the teleuto-sori being taken from Sydow and Butler (l.c.). The uredo is very characteristic and agrees in every detail with the description of the uredo of *Cronartium Zizyphi*; a number of rusts described from India have been found to occur in South Africa.

***Puccinia Allii* (DC) Rud.**

in *Linnaea* IV (1829) p. 392; Syd. Monogr. Ured. I (1904) p. 614.

Uredosori amphigenous, scattered or crowded and becoming more or less confluent, ellipsoid or oblong, usually up to 0.5 mm. long; at first covered by the blistered epidermis, which ruptures longitudinally but remains partly veiling the yellowish-brown spore masses. Uredospores broadly ellipsoid or subglobose, 25–35 \times 17.5–22.5 μ ; wall 1.5–2 μ thick, finely and rather sparsely echinulate; germ pores 5–8, scattered.

Teleutosori amphigenous, scattered or in irregular groups, oblong or irregular in form and size, black, compact, remaining covered by the epidermis; often developing in oval to ellipsoid rings round the uredosori, the rings being up to 3 mm. long and 1 mm. broad. Teleutosori compound, composed of closely crowded individual sori; these are mostly 60–100 μ diam. and 100–125 μ deep, each surrounded by an envelope of firm, palisade-like golden-brown paraphyses. Teleutospores rather variable in form, mostly oblong-clavate to clavate, rather pale golden-brown, deeper brown at the apex, 45–80 \times 20–27.5 μ ; rounded, truncate or bluntly conical, sometimes oblique, at the apex, attenuate at the base; more or less constricted at the septum; wall smooth, 1.5–2 μ thick, slightly thickened at the apex, up to 8 μ . Pedicel hyaline, short, sub-persistent.

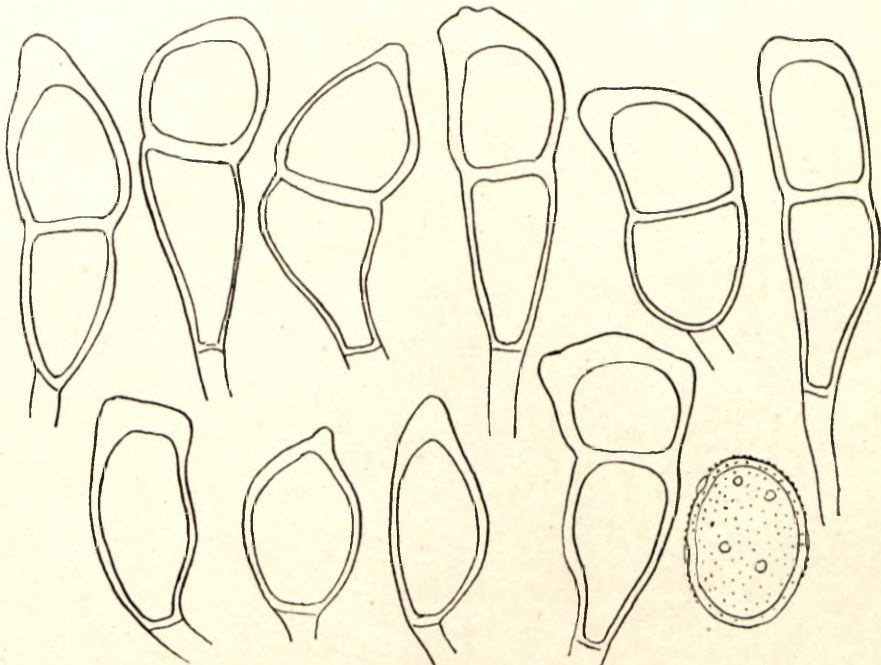


Fig. 2.—*Puccinia Allii*. Teleuto- meso- and uredo-spores.

Mesospores present, fairly numerous, similar in form to the upper cell of the teleutospore, ca. $40-45 \times 17.5-20 \mu$.

on *Allium sativum* Linn., leaves and peduncles, Joubertina, *Reinecke*, 32390, 32687, 33332; Oudtshoorn, *du Plessis*, 33926.

Sydow (l.c.) mentions two species of *Puccinia* on *Allium* which have compact, paraphysate teleutosori:—

Puccinia Blasdalei Diet. et Holw. which has aecidia; it is an autoecious species and mesospores are found in the teleutosori. It occurs in America.

Puccinia Allii (DC.) Rud. which has neither aecidia nor mesospores; it is known on *Allium sativum* as well as on a number of other *Allium* spp., and occurs mostly in the Mediterranean region, including Algeria and Abyssinia.

Sydow also states that he had two *Puccinias* on *Allium sativum* and *Allium Dregeanum* from the Cape, the former having many, the latter few mesospores. He considers that these rusts are near *Puccinia Blasdalei*, but doubts whether they belong to this species.

The South African rust on garlic, described above, is in complete agreement with *Puccinia Allii* except for the presence of mesospores, and it is assigned to this species until further studies can be made. During recent years this rust has become destructive in plantings of garlic in the Long Kloof area of the Cape Province.

There is no specimen of rust on *Allium Dregeanum* in the Pretoria Herbarium, and attempts to find a rust on this host have not been successful.

***Puccinia canaliculata* (Schw.) Lagerh. var. *tenuis* Doidge var. nov.**

A typo differt teleutosporis $35-65 \times 11-15 \mu$, tenuioribus et pallidioribus; pedicello usque 50μ longo; aecidiis ignotis.

Hab in foliis *Cyperii esculenti*, Brits., leg. F. M. du Toit, 33120.

Uredosori mostly hypophyllous, scattered, oblong, $0.5-2$ mm. long, long remaining covered, but at length dehiscent by longitudinal slits, the ruptured epidermis being conspicuous on either side of the somewhat pulverulent spore masses. Uredospores broadly ellipsoid to ovate, $19-29 \times 13-19 \mu$; epispore yellowish or cinnamon-brown, uniformly $1-2 \mu$ thick, moderately and finely echinulate; germ pores 2, equatorial.

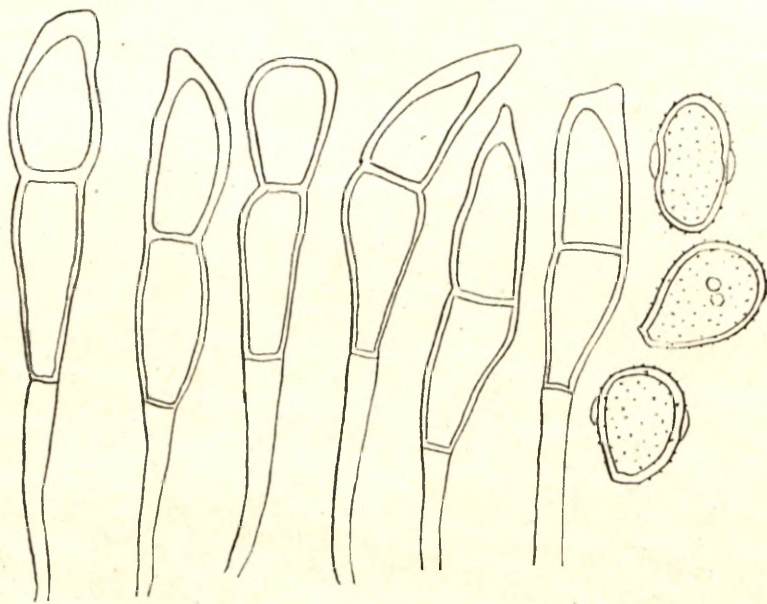


Fig. 3—*Puccinia canaliculata* var. *tenuis*. Teleuto- and uredo-spores.

Teleutosori hypophyllous, black or greyish-black, scattered or, more frequently, confluent in groups, 1–3 mm. long or longer, long covered by the epidermis, not raised above the leaf surface or only slightly so; individual sori linear, $100\ \mu$ or less in diameter, surrounded by a well developed stroma which is chestnut-brown immediately below the crowded sori, becoming paler as it extends towards the upper epidermis; individual sori separated by dark or paler chestnut-brown, palisade-like paraphyses. Teleutospores clavate-oblong, $35\text{--}65\ \mu$ long, $11\text{--}15\ \mu$ broad, acuminate, obtuse or rounded at the apex, not constricted at the septum or slightly so, gradually attenuate at the base; epispore pale cinnamon-brown at the apex, paler towards the base, ca. $1\ \mu$ thick, thickened at the apex, $3\text{--}8\ \mu$; pedicel persistent, tinted, up to $50\ \mu$ long.

on *Cyperus esculentus* Linn., on leaves, Hartebeestpoort, Brits, *F. du Toit* 33120; Fort Beaufort, *Pole Evans* 302; II. Groenkloof, *Pole Evans*, 8930; Tweedie, *Mogg.* 23149; Hartebeestpoort, Brits, *Doidge and Bottomley*, 33270; Malagazi, Natal, *Wager*, 32719.

The South African rust was compared with an American collection on the same host (*Reliquiae Holwayana* 176) and with the description given by Kern (*Mycologia* XI, 1919, p. 136) in his studies on rusts on *Cyperus* and *Eleocharis*. In his key, *Puccinia canaliculata* (Schw.) Lagerh. is characterised by uredo-spores with two equatorial germ pores and wall uniformly $1\text{--}2\ \mu$ thick. The stromatic tissue beneath the paraphysate teleuto-sori is also characteristic.

The South African rust on *Cyperus esculentus* differs only in the form of the teleutospores, which are consistently more slender, $11\text{--}15\ \mu$ broad, compared with $15\text{--}21\ \mu$ in the type.

***Puccinia Dichondrae* Mont.**

in Gay, *Fl. Chil.* VIII (1853) p. 46 et *Crypt.* (1856) p. 313. *Syd. Monogr. Ured.* I (1904) p. 321.

Puccinia Duthiei van der Byl in *S. Afric. Journ. Sci.* 24 (1927) p. 226.

Teleutosori hypophyllous, not causing leaf spots, very numerous and closely crowded, often occupying the whole leaf surfaces; at first veiled by the leaf hairs, very minute and difficult to detect, then slightly larger, punctiform, subpulverulent, deep cinnamon-brown. Teleutospores oblong or oblong-clavate, sometimes asymmetrical and irregular, $25\text{--}45 \times 14\text{--}19\ \mu$, occasionally up to $24\ \mu$ broad; more or less rounded or broadly conical at the apex, which is furnished with a hyaline or subhyaline papilla $1\text{--}6\ \mu$ long and $5\text{--}7\cdot5\ \mu$ broad at the base; rounded or somewhat attenuate at the base; slightly constricted at the septum, cells usually sub-equal; epispore smooth, thin, ca. $1\ \mu$ thick, not thickened at the apex; pedicel delicate, subhyaline, up to $25\ \mu$ long, ca. $5\ \mu$ thick at the apex.

on *Dichondra repens* Forsk., on leaves, Grahamstown, *Archibald*, 33278; Belvidere, Knysna, *Duthie* (v. d. Byl 2337).

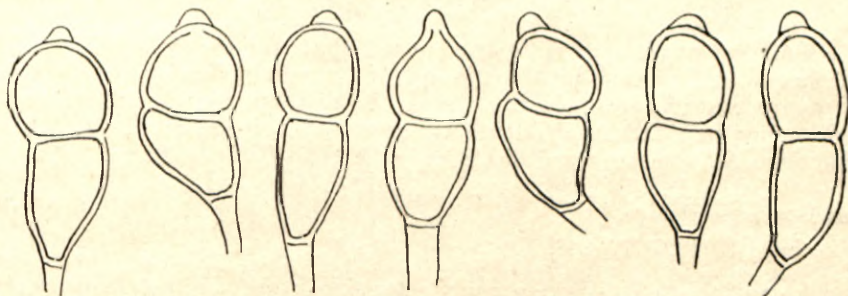


Fig. 4.—*Puccinia Dichondrae*. Teleutospores.

The type specimen of *Puccinia Duthiei* is *v. d. Byl 2337*; on this specimen there is a note in Miss Duthie's handwriting that the host is "possibly *Falkia repens*"; the plant was not found in flower. On comparison with specimens in the National Herbarium, there seems to be no doubt that the host is *Dichondra repens*, a somewhat similar plant, and that *Puccinia Duthiei* is identical with *P. Dichondrae*. The aecidia have not been found.

***Puccinia Helianthi* Schw.**

O.I. Not seen.

II. Uredosori chiefly hypophyllous, not on leaf spots, pulverulent, cinnamon-brown. Uredospores globose, broadly ellipsoid or ovate, yellow-brown to brown, $22-34 \times 19-26 \mu$; episore dark cinnamon-brown, $1-2 \mu$ thick, finely echinulate, with 2 equatorial germ pores.

III. Teleutosori amphigenous, but more numerous and conspicuous on the under side of the leaf, scattered, or in groups and becoming confluent, round, pulvinate, compact, blackish-brown, 0.5-2 mm. diam. Teleutospores ellipsoid, or oblong; at the apex more or less broadly rounded or obtusely conical, slightly constricted at the septum, rounded at the base, $35-58 \times 20-30 \mu$, episore chestnut-brown, smooth, $1.5-3 \mu$ thick, thickened at the apex, which is paler, $6-12 \mu$; germ pores apical and just below the septum. Pedicel hyaline, stout, persistent, $8-10 \mu$ thick and up to 115μ long.

on leaves of *Helianthus annuus* Linn., Bulawayo, Hopkins (Rh. 5988) 34031; Naboomspruit, 34051; Buffelspoort, Redpath, 34077.

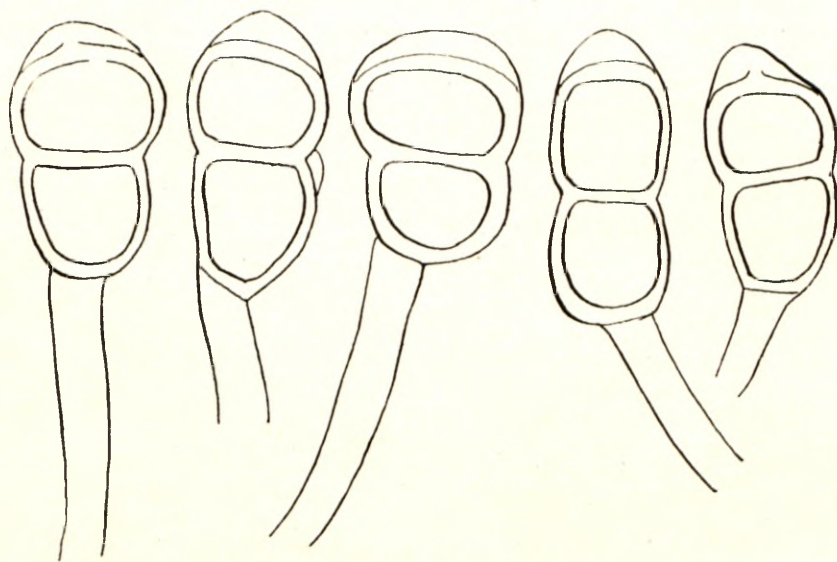


Fig. 5.—*Puccinia Helianthi*. Teleutospores.

The sunflower rust is apparently a recent introduction into southern Africa. In 1943, it was collected at Bulawayo by Hopkins and at Umbeluzi, Mozambique, by Cardoso. A report was received of a destructive outbreak of "rust" in commercial plantings of sunflowers in the northern Transvaal, in 1943, but it was not until January, 1944, that specimens were sent from Naboomspruit and identified as *Puccinia Helianthi* Schw.

***Puccinia Isoglossae* Doidge.**

Bothalia II (1927) 72, 208.

The hosts of this fungus were wrongly determined; they are not *Isoglossa ovata* Nees and *I. Woodii* C.B.Cl., but *Hypoestes* sp. (No. 2399) and *Hypoestes verticillaris* R. Br. (No.

9075). Only teleutospores have been found on these two collections. *Uredo Hypoestis* Cooke and *Aecidium Acanthacearum* Cooke occur fairly commonly on species of *Hypoestis* and *Isoglossa*, but in the material available for study, no evidence could be found of any connection between these forms and *Puccinia Isoglossae*.

Puccinia Krookii P. Henn.

in Ann. Naturhist. Hofmus. Wien (1900) p. 1; Syd. Monogr. Ured. I (1904) p. 426; Doidge, Bothalia II (1927) p. 88.

This rust was originally collected at Harrismith by Krook on *Epilobium* sp., a number of subsequent collections having been made on *Epilobium hirsutum* (Doidge l.c.). According to Sydow, this species differs from *Puccinia Epilobii-tetragoni* on *Epilobium hirsutum* (DC.) Wint. in the absence of aecidia and the larger teleutospores tapering to the pedicel.

Recent collections have again been compared with *Puccinia Epilobii-tetragoni* on *Epilobium hirsutum* (Syd. Myc. Germ. 1464, 1465). *Puccinia Krookii* was collected by Mogg at Pyramids near Pretoria, the uredo- and teleuto-forms in January, 1940 (32434) and an aecidium on the same host and in the same locality in December 1939 (32654); some of the aecidia on the last-named collection are rather old and a few typical uredosori of *P. Krookii* have developed on the same leaves.

There is no difference between the aecidia of the two species; there is no significant difference in the size of the uredospores and the germ pores appear to be similarly placed, but the uredospores of *P. Krookii* are usually darker and the germ pores more conspicuous. The teleutospores of *P. Krookii* are definitely longer and more frequently attenuated towards the pedicel; they have a darker, finely punctuate epispore; in teleutospores of *P. Epilobii-tetragoni* the epispores is smooth. The two rusts are evidently very closely related.

The aecidium of *P. Krookii* may be described as follows:—

Aecidia hypophyllous, distributed equally and closely over the whole leaf surface, cupulate, 250–350 μ diam.; margin of the peridium white, laciniate, revolute; cells of the peridium firmly joined together, mostly more or less rhomboid, 20–27.5 \times 15–25 μ , outer wall finely striate, 5–6 μ thick, inner verrucose, 3–4 μ thick. Aecidiospores mostly ovate to broadly ellipsoid or oblong, often angular, 19–22.5 \times 12.5–17.5 μ , very minutely verrucose, wall ca. 1.5 μ thick.

on *Epilobium hirsutum* Linn., Pyramids, near Pretoria, Mogg, 32645.

Puccinia Le Testui Maubl.

in Bull. Soc. Myc. Fr. XXII (1906) p. 71.

Aecidia on reddish-brown, indefinite leaf spots, hypophyllous, solitary or in small irregular groups of 2–5, scattered over the leaf surface, cupulate, 150–200 μ diam. Peridium white, margin lacinate; cells of the peridium rhomboid, rather loosely connected, 19–35 \times 16–19 μ , outer wall striate, 4–5 μ thick, inner verrucose, 3–4 μ thick. Aecidiospores angular globose to ellipsoid, subhyaline, densely and minutely verruculose, 18–24 \times 16–20 μ ; epispore ca. 1 μ thick.

Teleutosori hypophyllous, interspersed with the aecidia and causing a similar reddish- or purplish-brown discolouration of the leaf tissues, scattered or in small irregular groups, black, pulvinate, compact, round or elliptic in outline, up to 1 mm. diam.; at first covered by the blistered epidermis, which ruptures irregularly and often remains partly veiling the compact spore masses. Teleutospores oblong or oblong-clavate, chestnut-brown; usually rounded at the apex, less frequently subtruncate or obtusely conical, in the latter case sometimes more or less oblique; attenuate, rarely somewhat rounded at the base; slightly constricted at the septum, cells sub-equal in length or the upper somewhat shorter, 36–52.5 \times 16–25 μ ; epispore smooth, 2–2.5 μ thick, thickened at the apex, up to 8 μ ; germ pores

apical and just below the septum; pedicel stout, persistent, up to $50\ \mu$ long, $6\text{--}8\ \mu$ broad at the apex, slightly tinted. Mesospores present, ellipsoid or subclavate, $28\text{--}45 \times 16\text{--}20\ \mu$. on *Vernonia glabra* Vatke, Rusapi, R. Rhodesia (Rh. 4096) 33425.

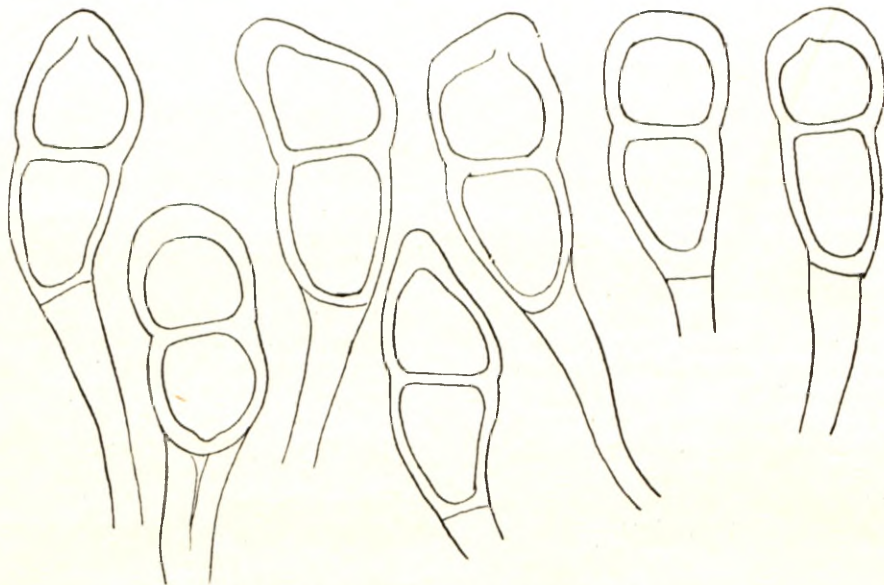


Fig. 6.—*Puccinia Le Testui*. Teleutospores.

Puccinia Le Testui was described by Maublanc on a *Vernonia* sp. "e sect. Decaneuron", collected at Marromen, Mozambique; *Vernonia glabra* also belongs to that section of the genus.

In the material examined, there is a fairly distinct, apical germ pore in the teleutospores and—especially in spores tapering to the apex—a paler area at the apex, but there is no distinct papilla. With this exception, the Rhodesian rust agrees exactly with the description of the type.

***Puccinia natalensis* Diet. and Syd. var. *Evansii* Doidge.**

This variety was described from two collections from the northern Transvaal of a plant identified as *Lantana salvifolia*. A more critical examination reveals that the host is not a *Lantana*, but a species of *Lippia*. The rust does not differ in any essential from *Puccinia lippivora* Syd.

Puccinia natalensis var. *Evansii* must therefore be regarded as a synonym for *P. lippivora*, the particulars being as follows:—

***Puccinia lippivora* Syd.**

Syn: *Puccinia natalensis* Diet. and Syd. var. *Evansii* Doidge in *Bothalia* II (1927) p. 82.

on *Lippia* sp., Barberton, *Pole Evans*, 1850; Duivelskloof, *Doidge*, 1816.

***Puccinia Tetragoniae* McAlp.**

McAlpine in *Agric. Gaz. of New South Wales* VI (1895) p. 854; Syd.

Monogr. Ured. I (1904) 563; *Cunningham, The Rust Fungi of New Zealand* (1931) p. 146.

var. *austro-africana* Doidge var. nov.

A typo differt uredosporis minoribus, $20-26 \times 17.5-20 \mu$, episporio tenuiore $1.5-2 \mu$ crasso; teleutosoris caulicolis, teleutosporis minoribus, $30-50 \times 22.5-35 \mu$.

Hab. in foliis caulisque *Tetragonia expansae*, Pietersburg, leg. Palte, 34095.

O.I. Pycnidia and aecidia not seen.

II. Uredosori amphigenous, mostly hypophyllous, scattered or in irregular groups, usually subcircular, sometimes elongated or irregular in outline, $0.5-1$ mm. diam., cinnamon-brown, surrounded by the torn epidermis. Uredospores obovate, ellipsoid or subglobose, $22.5-32 \times 17.5-25 \mu$; episporium pale yellow, rather closely and coarsely echinulate, $1.5-2 \mu$ thick; germ pores rather conspicuous, $5-6$, scattered.

III. Teleutosori caulicolous, none seen on the leaves in the South African material, in elongated, more or less elliptical groups, which sometimes coalesce; single sori almost round to elliptic, up to 1 mm. long, long remaining covered, later naked, black, bullate, surrounded by the torn epidermis. Teleutospores ellipsoid, subclavate or irregular in form, occasionally broader than long, deep chestnut-brown, $30-50 \times 22.5-35 \mu$; apex usually rounded, sometimes truncate or conical, occasionally oblique; base rounded, seldom attenuate; slightly constricted at the septum, cells usually sub-equal, but the lower sometime narrower or broader than the upper; episporium smooth, $3-4 \mu$ thick, not thickened at the apex, or slightly thickened, $5-6 \mu$, rarely up to 8μ ; germ pores apical and just below the septum; pedicel persistent, slightly tinted at the apex, up to 35μ long and 8μ broad. Mesospores fairly numerous, clavate or irregular in form, $30-40 \times 22-30 \mu$, similar in character to the teleutospores.

on *Tetragonia expansa* Murr., "New Zealand Spinach", on leaves and stems, Pietersburg, April 1944, Palte, 34095; Wellington, Verwoerd (Stell. 471); Stellenbosch, Verwoerd (Stell. 369).

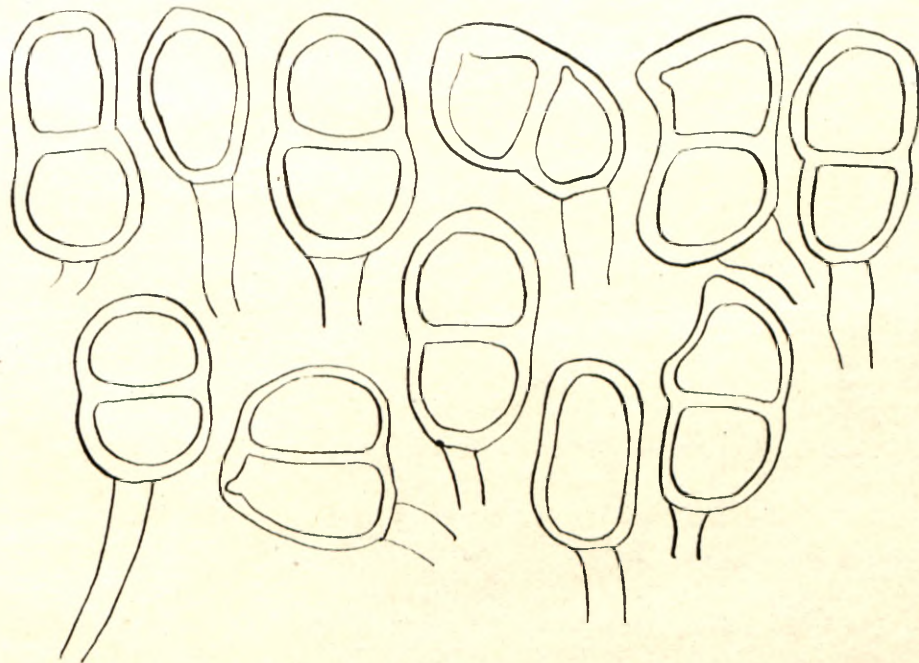


Fig. 7.—*Puccinia Tetragoniae* var. *austro-africana*. Teleutospores and mesospores.

To Dr. Cunningham I am indebted for material of two collections of *Puccinia Tetragoniae* McAlp. from New Zealand, one on *Tetragonia trigyna* and the other on *Tetragonia expansa*. Dr. Cunningham states that specimens of *T. implexicoma* from McAlpine's herbarium in

Melbourne, forwarded to him by C. C. Brittlebank, carried spores, which though slightly smaller, agreed so closely with those of the New Zealand rust, that he referred collections of the latter to McAlpine's species.

On the other hand, a comparison of the New Zealand material with the South African collections has confirmed the view that the South African rust should be regarded as a distinct variety. Collections from the Stellenbosch herbarium, kindly supplied by Dr. Dippenaar, agree in every particular with those from the Northern Transvaal.

Comparative measurements are as follows:—

| | |
|--|---|
| Australian collections (McAlpine)..... | Uredospores 27-32 × 22-25 μ. Teleutospores 39-59 × 25-31, av. 50 × 28 μ. |
| New Zealand collections (Cunningham).. | Uredospores 28-36 × 22-28 μ. Teleutospores 52-60 × 32-40, av. 56 × 36 μ. |
| South African collections..... | Uredospores 22·5-32 × 17·5-25 μ. Teleutospores 30-50 × 25-35, av. 40 × 27·5 μ. |

The sori and spores of the South African collections are similar in character to those of typical *Puccinia Tetragoniae*, but the spores are consistently smaller and thinner walled. The teleutosori are caulicolous and not amphigenous as described by Cunningham for the type.

Ravenelia atrides Syd.

in Ann. Myc. X (1912) p. 438; Monogr. Ured. III (1915) p. 307; Doidge *Bothalia* II (1927) p. 153.

on *Grewia monticola* Sond., Nelspruit, *Doidge*, 32401.

Grewia kwebensis N.E. Br., Olifants River Camp, Kruger National Park, *Liebenberg* 3609, 32731.

This rust, previously only known from the Natal coast on *Grewia caffra* and *G. occidentalis*, has now been found in the eastern Transvaal on the hosts mentioned above.

Ravenelia Baumiana P. Henn.

in Bot. Ergebnisse der Kunene-Sambesi Exped. (1903) p. 157; Syd. Monogr. Ured. III (1915) p. 262; Doidge, *Bothalia* II (1927) p. 148.

on *Cassia delagoensis* Harv., Schagen, *Liebenberg* 3579, 30955; Nelspruit, *Doidge*, 32404.

This is a new host record; *Ravenelia Baumiana* was originally collected by Baum at Humbe, South West Africa on *Cassia goratensis* Fres., it has also been found in Southern Rhodesia on that host.

Ravenelia MacOwaniana Pazschke.

The teleutosori of this rust are described as occurring on the leaves, amphigenous round, 0·5-1 mm., diam., dark brown. A recent collection (32169) on *Acacia Karroo* Hayne, made by Dr. Leeman at Grahamstown, shows teleutosori produced in groups on slightly thickened branches; large incrustations are formed, extending along the small branches to a length of 1-6 cm. The sori develop on the inner bark, pushing up the outer bark, which becomes detached in superficial scales. Only a few leaflets were included in the collection and on those typical sori were observed. The spores from sori on branches are indistinguishable from those found in the leaf sori.

Ravenelia modesta Doidge.

in *Bothalia* III, 1 t. IV ; p. 504 (1939).

Aecidia fructicolous, in more or less circular groups, up to 1 cm. diam., on somewhat hypertrophied parts of green legumes, closely and fairly evenly distributed, deeply immersed (ca. 500 μ) in the tissues of the host, the torn epidermis forming a collar round the upper part of the peridium, which is exerted up to 500 μ . Aecidia 300–400 μ diam., briefly cylindrical, margin erect, denticulate. Cells of the peridium imbricate, firmly jointed together, very irregular in form and size, often rhomboid or oblong, mostly 30–50 \times 12.5–20 μ ; outer wall striate, 7.5–9 μ thick, inner verrucose, 3–4 μ thick. Spores ovate, subglobose or irregular in form, often angular, pale, 21–28 \times 12.5–21 μ ; wall subhyaline 2–2.5 μ thick, not thickened at the apex, very finely and closely verruculose.

Separate uredo-sori not seen; uredospores found round the margin of the teleutosori, pale, ellipsoid, ovoid or subglobose, 25–35 \times 15–25 μ ; epispore ca. 2 μ thick, finely and rather distantly verruculose-echinulate; germ pores numerous, scattered. Paraphyses numerous, pale fuscous, clavate or clavate-spathulate, occasionally subcapitate, straight or curved, 40–50 μ long; 7.5–10.5 μ thick at the apex.

on leaves and pods of *Acacia Gillettiae* Burt Davy, Bosplaas, between Hamanskraal and Pienaars River, 21/3/45, A. O. D. Mogg, 34572.

The teleutospores of *Ravenelia modesta* were described and illustrated (Doidge, l.c.) from sori occurring on leaves of *Acacia stolonifera* Burch.; a re-examination of the type material reveals a few uredospores at the margin of the teleutosori, but these are parasitised, by *Darlucia filum*. In the collection quoted above on *Acacia Gillettiae*, a closely related species of *Acacia*, there are well-developed aecidia and fairly numerous uredospores in the teleutosori.

Uredo Dombeyae Doidge nov. spec.

Sori amphigeni, sparsi, primitus sine maculis, minuti, ca. 0.5 mm. diam., plus minus rotundati, mox nudi, brunnei, deinde majores, ca. 3 mm. diam. maculis brunneis ca. 5 mm. diam. insidentes. Uredosporae plerumque ovatae, rarius subgloboasae, ellipsoideae v. clavatae, subhyalinae v. pallide flavo-brunneae, remote aculeatae, aculeis usque 1 μ longis, 32.5–50 \times 20–27.5 μ , episporio 4–5 μ crasso, nonnunquam usque 6 μ , ad apicem incrassato, 8–12 μ , poris duobus distinctis aequatorialibus oppositis praedita.

Hab. in foliis *Dombeyae natalensis* Sond., Stella Bush, Durban, leg. Wager, 33193.

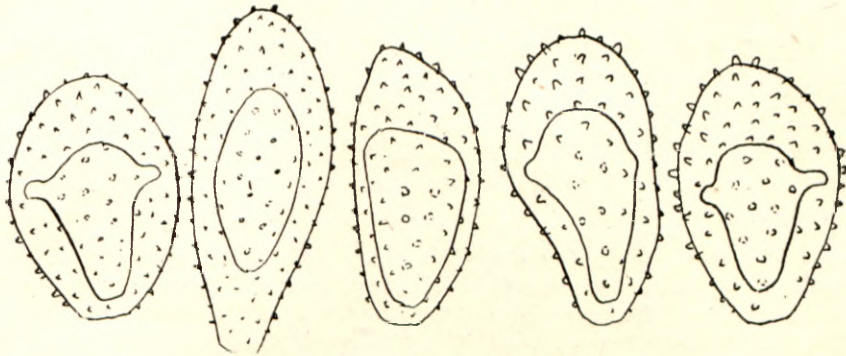


Fig. 8—*Uredo Dombeyae*. Uredospores.

Uredo Ehrhartae-calcinae Doidge nov. spec.

Sori amphigeni elliptici sparsi vel hinc inde aggregati sed haud confluentes elliptici, 0.5–1.5 mm. longi, primitus epidermide tecti dein ea fissa cincti, pulverulentes, cinnamomei, Spori ovati, ellipsoidei v. subglobosi, pallide brunnei v. flavo-brunnei, 20–29 \times 17.5–20 μ , verruculoso-echinulati, episporio 3.5–4 μ crasso, prois germ. 4–6 sparsis praedito.

Hab. in foliis *Ehrhartae calcinae*, Stellenbosch, leg. Verwoerd (Herb. Stell. Elsenburg Coll. Agric. 41) 34098.

No uredo has been found associated with *Uromyces Ehrhartae-giganteae* Doidge of which several collections on *Ehrharta gigantea* have been examined, and no teleutospores are to be found on the collections of *Ehrharta calycina* available.

Uromyces Ehrhartae McAlp., which occurs on a grass of a closely related genus, *Microlaena stipoides* R. Br., has uredo-sori which closely resemble those of *Uredo Ehrhartae-calycinae*. According to McAlpine's description (The Rusts of Australia, 1906, p. 86) the uredospores are subglobose to oval, orange, finely echinulate, $21-25 \times 18-20 \mu$, with 3-4 scattered germ pores on one face. The thickness of the wall is not mentioned. The South African rust described above, has very thick-walled spores, which are coarsely verruculose-echinulate and have 4-6 scattered germ pores.

Uredo rhoina Syd.

in Deutsche Zentral Afrika Exped. 1907/8, Berlin (1910) p. 97; Monogr. Ured. IV (1924) p. 456.

Uredosori hypophyllous, scattered or becoming numerous and crowded, very minute or up to 2 mm. diam., cinnamon-brown, early becoming naked, pulverulent, more or less concealed amongst the stellate hairs on the leaf of the host. Uredospores very variable in form, ovate, ellipsoid, subglobose, oblong or clavate, $20-35 \times 15-21 \mu$; episporium ca. 1.5μ thick, often somewhat thickened (up to 5μ) at the apex, which is rounded or bluntly conical; briefly verrucose-aculeate, being closely set with acute verrucae arranged in indistinct longitudinal rows; germ pores 2-3 equatorial.

on *Lannea discolor* Sond., leaves, Nelspruit, Doidge, 32395.

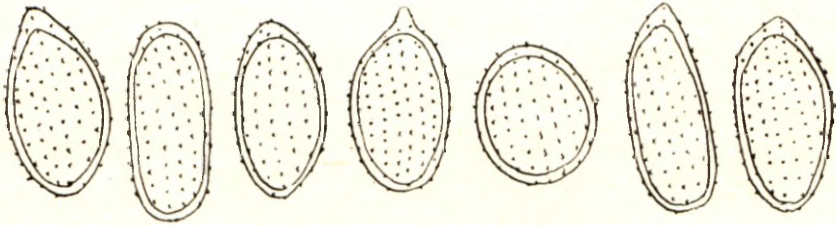


Fig. 9.—*Uredo rhoina*. Uredospores.

Uromyces Aloes (Cooke) P. Magn.

in Ber. Deutsch. Bot. Gesellsch. X (1892) p. 48; Syd. Monogr. Ured. II (1910) p. 265; Doidge, Bothalia II (1927) p. 39.

on *Haworthia atilinea* Haw., Vincent, C.P., G. G. Smith, 33326.

Haworthia Reinwanatii Haw., Vincent, G. G. Smith, 33324.

Haworthia retusa (L.) Haw., Vincent, G. G. Smith, 33325.

Haworthia spp., Vincent, G. G. Smith, 33252, 33327.

This rust has been recorded on a large number of *Aloe* spp., and is extremely common on plants belonging to that genus; it has not been recorded on hosts belonging to other genera. The plants of *Haworthia* spp. found infected, were growing in cultivation near infected *Aloes*; the sori are comparatively small on these hosts, but the teleutospores are identical with those found on *Aloe* spp.

Uromyces Cassiae-mimosoidis Doidge nov. comb.

Uredo Cassiae-mimosoidis Doidge in Bothalia IV (1941) p. 233.

Uredo-sori amphigeni, sparsi v. aggregati, rotundati v. elliptici, 0.5-0.75 mm. longi, interdum confluentes, ferruginei, pustuliformes, diutius epidermide pallida tecti, dein ea fissa cincti vel semivelati, pulverulenti. Uredosporae ovatae, ellipsoideae, subgloboae v. irregulares, $21-27.5 \times 16-21 \mu$ densiuscule breviterque echinulatae, aureo-brunneae, episporio $1.75-2.5 \mu$ crasso, poris germ. 2-4, plerumque 3, equatorialibus, conspicuis.

Teleuto-sori conformes, cinnamomei. Teleutoeporae aureo-brunneae, ellipsoideae ovatae, subglobosae v. plus minus irregulares, interdum angulatae, $17.5-30 \times 12.5-17.5 \mu$, plerumque $20-25 \times 15 \mu$, ad apicem rotundatae, papilla hyalina $5-6 \mu$ lata, $1-1.5 \mu$ alta ornatae, verrucis majusculis fere hemisphericis ca. 1 mm. latis irregulariter obsitae, episporio $1.5-2 \mu$ crasso, apice haud incrassato; pedicello brevi, persistenti, hyalino.

Hab. in foliis *Cassiae mimosoidis* Linn., Buffelspoort, leg. Doidge et Bottomley, 32170.

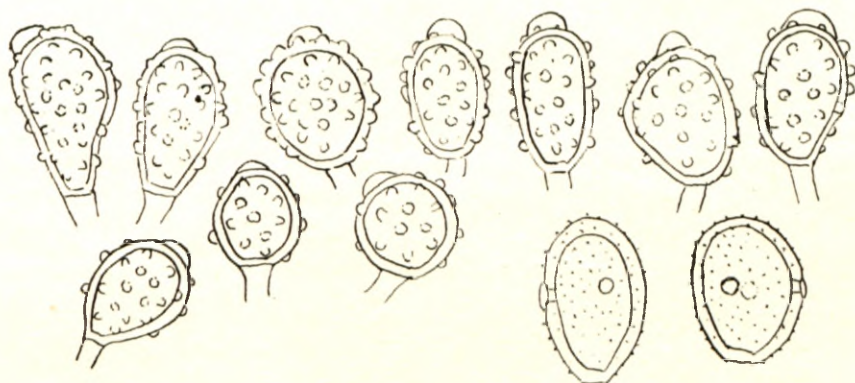


Fig. 10.—*Uromyces Cassiae-mimosoidis*. Teleuto- and uredo-spores.

The uredo-form was also found at Fairy Glen near Pretoria, *Doidge*, 30915, and at Donkerpoort, Pretoria Distr., *Doidge and Bottomley*, 29741.

Uromyces euphorbiicola (Berk. and Curt.) Tranzsch.

in Ann. Myc. VIII (1910) p. 8; Syd. Monogr. Ured. II (1910) p. 16. sub *Uromyces proëminens* (DC) Lév. in Doidge, *Bothalia* II (1927) p. 10.

on *Euphorbia prostrata* Ait., Durban, *Medley Wood*, 809, 11124, 14200; Maritzburg, *J.M. Sim*, 9202; Pretoria, *Pole Evans*, 6962, *Hean*, 30643; Salisbury (Rh. 2072).

Some of the collections quoted were recorded in a previous paper (*Doidge l.c.*) as *Uromyces proëminens* (DC.) Lév., the host having been incorrectly determined as *Euphorbia inaequilatera* Sond.

The acidia and the uredo- and teleuto-sori of the two rusts are very similar, the chief difference being in the uredospores. In *Uromyces euphorbiicola* the uredospores have most commonly 3 equatorial germ pores, rarely 2 or 4. Uredospores of *U. proëminens* have 4-6 germ pores, most commonly 5, of which one is apical; the latter rust is not known to occur on *Eu. prostrata*.

Uromyces Krantzbergensis Doidge nov. spec.

Teleuto-sori amphigeni, sparsi v. plures aggregati et dense dispositi, primitus elliptici, $4-6 \times 1.5-2 \text{ mm.}$, confluyendo saepe usque 2 cm. longi et 4 mm. lati, epidermide bullata diu tecti dein ea semivelati, valde pulverulenti, cinnamomei. Teleutosporae quoad formam variables, subglobosae, ovoidae v. oblongae, saepe plus minus angulatae, leves, pallide aureo-brunneae, $22.5-32.5 \times 22.5-27.5 \mu$, episporio ca. 2.5μ crasso, apice haud vel leniter incrassato ($4-5 \mu$); pedicello hyalino, deciduo, usque 50μ longo, apice $4-5 \mu$ crasso.

Hab. in foliis *Liliaceae* indet., Krantzberg, leg. Dyer, Verdoorn at Erens, 34505.

Sori amphigenous, scattered or in elliptic groups; single sori elliptic, $4-6 \times 1.5-2 \text{ mm.}$, usually becoming coalescent and forming larger sori up to 2 cm. long and 4 mm. broad, often occupying the whole width of the leaf; long covered by the pale, blistered epidermis, which finally ruptures but remains partly veiling the pulverulent, cinnamon-brown mass of spores.

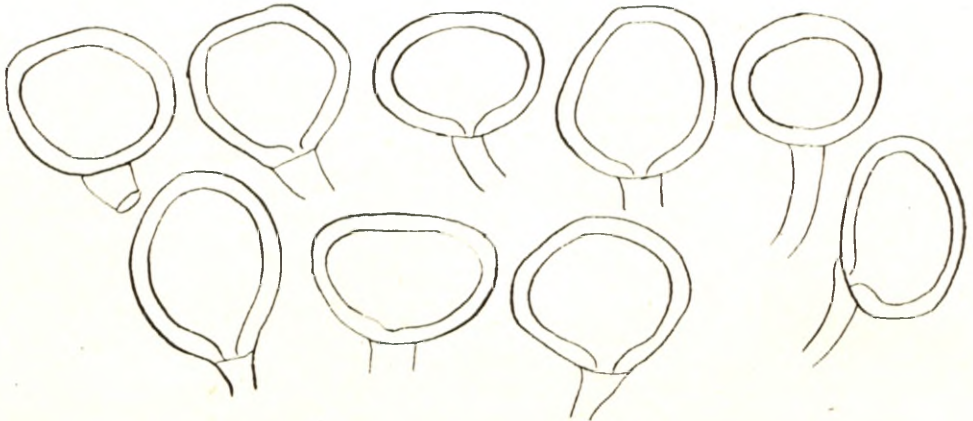


Fig. 11.—*Uromyces Krantzbergensis*. Teleutospores.

Teleutospores very variable in form, globose, flattened globose, ovoid or oblong, frequently broader than long and often more or less angular; broadly rounded or flattened at the apex, more or less rounded at the base; epispore smooth, pale golden-brown, ca. $2.5\ \mu$ thick, not thickened at the apex or very slightly so ($4-5\ \mu$), germ pore basal, immediately above the pedicel; pedicel deciduous, hyaline, up to $50\ \mu$ long, $4-5\ \mu$ thick at the apex and tapering downwards.

on leaves of *Liliaceae* undet., probably *Anthericum* sp., on Farm Waterval, western side of the Krantzberg, on slopes towards the Matlabas River, north-western Transvaal, 5/1/42, Dyer, Verdoorn and Erens 4197, 34505.

Uromyces Maireanus Syd.

in Monogr. Ured. II (1910) p. 280; Doidge, Bothalia II (1927) p. 43.

Acidia hypophyllous, rather closely crowded in elliptical groups up to 6 mm. long; at first closed, covered by the raised epidermis, then open, cupulate, $250-350\ \mu$ diam.; margin of the peridium white, erect, denticulate, surrounded by the torn epidermis. Cells of the peridium rather loosely connected, subrhomboid, oblong or irregular, $25-40 \times 15-22.5\ \mu$; outer wall smooth, $5-6\ \mu$ thick, inner finely verrucose, $2.5-4\ \mu$ thick. Aecidiospores yellow in mass; single spores subhyaline, globose, ovate or ellipsoid, often more or less angular, $20-27.5 \times 16-21\ \mu$; wall finely and closely verruculose, $1.5-2\ \mu$ thick.

on *Ornithogalum flavovirens* Bkr., on leaves, Grahamstown, Archibald, 33275, 33328.

The acidium was not described by Sydow. On No. 33328, the acidia are closely associated with the uredo- and teleuto-sori on the same leaves. This rust was originally described on *Ornithogalum sessiliflorum* collected by Maire in Algiers; in South Africa it has been found on *O. Roodeae*, collected at Clanwilliam, and on *O. flavovirens* as recorded above.

Uromyces Polemanniae Kalchbr. and Cooke.

in Grevillea XI (1882) p. 21; Syd. Monogr. Ured. II (1910) p. 52; Doidge, Bothalia II (1927) p. 16.

on *Polemannia montana* Schlechtr. and Wolf, Bulwer, Natal, Haygarth, 33228.

This rust, which apparently is somewhat rare, has only been known from the type collection on *Polemannia grossulariaefolia* E. and Z., found near Somerset East by MacOwan. It has now been detected on a second host, *Polemannia montana*.

Uromyces Rhynchosiae Cooke emend. Doidge.

Uromyces ? *Rhynchosiae* Cooke, *Grevillea* X (1882) p. 24.

Uredo (*Trichobasis*) *Rhynchosiae* Kalchbr., *Grevillea* XI (1882) p. 24.

Puccinia Rhynchosiae Kalchbr. and Cooke, *Grevillea* XI (1992) p. 24.

Uromyces Dolichi Syd. (non Cooke) *Monogr. Ured.* II (1910) p. 122.

Uredospores hypophyllous, rarely a few scattered sori are to be found on the upper side of the leaf, minute, up to 0.3 mm. diam., scattered, often numerous, crowded and closely set over the whole leaf surface, but only occasionally becoming confluent, cinnamon-brown, pulverulent, surrounded by the torn epidermis. Uredospores globose, subglobose or broadly ellipsoid, golden-brown, $20-30 \times 18-22 \mu$, mostly $22-25 \times 18-20 \mu$; episore golden-brown, $2.5-3 \mu$ thick, minutely and rather sparsely echinulate; germ pores equatorial, usually 3, less frequently 2 or 4.

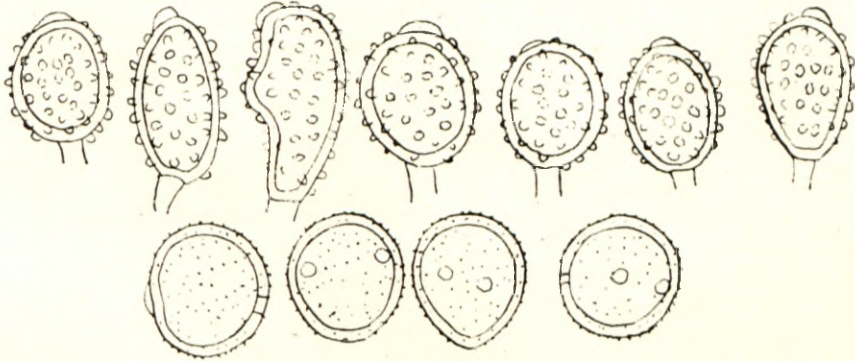


Fig. 12.—*Uromyces Rhynchosiae*. Teleuto- and uredo-spores.

Teleuto-sori similar to the uredo-sori but darker brown, pulvinate and less pulverulent. Teleutospores chestnut-brown, globose, ovate or ellipsoid, rounded at the apex, rounded or somewhat attenuate at the base, $18-27.5 \times 16-20 \mu$; usually papillate at the apex, the papilla being hyaline or subhyaline, flattened hemispherical, $6-7 \mu$ broad and $2.5-3 \mu$ high; episore $2.5-3 \mu$ thick, not thickened at the apex, rather grossly verrucose, being set with rounded warts, irregularly placed; germ pore apical; pedicel short, hyaline, persistent.

on *Eriosema cajanoioides* Benth., Schagen, *Liebenberg*, 29930.

Eriosema cordatum E. Mey., Inanda, *Medley Wood* 556, 621, 361, 10937, 11121, Kew.

Eriosema salignum E. Mey., Inanda, *Medley Wood* 528, 10618, Kew; Winkle Spruit, *Pole Evans*, 2371.

Eriosema spp., Entumeni, *Haygarth*, 14182; Lemana, *Doidge*, 1800, 1801.

Flemingia Grahamiana W. and A., Natal, *Medley Wood* 553, 610, 10627, Kew.

Rhynchosia adenodes E. and Z., *Medley Wood* 29, Type, 10502, Kew.

Rhynchosia caribaea DC., Garstfontein, *Pole Evans*, *Pienaar*, 8901; Donkerpoort, *Doidge* and *Bottomley*, 30082; Pretoria, *Mogg*, 26366; Durban, *McClellan*, 31028; Waterkloof, *Bosman*, 32889.

Rhynchosia Harmsiana Linn., Kentani, *Pegler*, 7811.

Rhynchosia Memnonia DC. var. *prostrata* Harv., Hebron, *Pole Evans*, 9053.

Rhynchosia orthodanum Benth., Inanda, *Medley Wood* 565, 579, 848, 10635, 10636, 11150, Kew.

Rhynchosia secunda E. and Z., East London, *Doidge*, 22415.

Rhynchosia totta DC., Pretoria, *Pienaar*, 2136.

Rhynchosia spp. undet., Inanda, *Medley Wood 24*, 10595, *Medley Wood 617*, 10619 ; Garstfontein, *Pienaar*, 1427 ; Pretoria, *Pole Evans*, 1431 ; Tugela Valley nr. Mont aux Sources, *Doidge*, 14155, 14163 ; East London, *Pienaar*, 2171 ; Silikats Nek, *Bosman*, 29898.

There has been some confusion between *Uromyces Dolichi* Cooke and *Uromyces Rhynchosiae* Cooke, partly owing to incorrect identification of some of the host plants.

In Grevillea X (1882) p. 127, the following statement follows the name :

“ *Uromyces Dolichi* Cooke :

I. *Aecidium Dolichi* Cooke, on leaves, petioldes and legumes of *Dolichos arillaris* Inanda, *Medley Wood 640*.

II. *Uredo Dolichi* B. and Br., Fungi of Ceylon 829 ?

III. *Uromyces phaseolorum* forma in *Dolichi gibbosi* etc.”

Aecidium Dolichi Cooke, *Medley Wood 640* is *Synchytrium Dolichi* (Cke.) Gaumann. *Uredo Dolichi* B. and Br. is not a South African form and if the teleuto-form is “ *Uromyces phaseolorum* forma ” it is most probably *Uromyces Vignae* Barcl., which occurs on *Dolichos* spp. ; there is no description and Cooke quotes no numbers for the teleuto-stage. *Uromyces Dolichi* Cooke is probably a synonym for *Uromyces Vignae* Barcl. The description of *U. Dolichi* in Sydow's Monograph (l.c.) applies to *Uromyces Rhynchosiae* Cooke and cannot be connected with *U. Dolichi* Cooke ; again no numbers are quoted.

On the same page of Grevillea (Vol. X p. 127) *Uromyces Rhynchosiae* Cooke is characterised as follows :—

“ I. *Aecidium Rhynchosiae* Cooke, on *Rhynchosia*, *Medley Wood 557*.

II. *Uredo* (*Trichobasis*) *Rhynchosiae* Kalchbr., on *Rhynchosia*, *Medley Wood 29* ; on *Eriosema salignum*, *Medley Wood 528*, *556* ; on *Flemingia*, *Medley Wood 553*.

III. Not seen.”

Aecidium Rhynchosiae Cooke, *Medley Wood 557*, is *Synchytrium Dolichi*. According to Sydow (Monogr. Ured. II, 1910, p. 350) *Uromyces Rhynchosiae* is only a uredo-form and to be excluded from the genus *Uromyces*. Portions of the collections quoted by Cooke and Kalchbrenner have been examined ; a few typical teleutospores were found mixed with the uredospores of *Medley Wood 29*, which must be regarded as Cooke's type for *Uromyces Rhynchosiae* ; this number is also quoted by Kalchbrenner (Grevillea XI, 1882, p. 24) as the uredo-form of *Puccinia Rhynchosiae* Kalchbr. and Cooke. The fungus has been re-described from No. 14163 on an undetermined species of *Rhynchosia*.

This rust is common on species of *Rhynchosia* and occurs also on *Eriosema* and *Flemingia* ; it has not been found on any *Dolichos* sp. Teleutospores are usually found rather late in the season, the best material having been collected in May and June.

***Uromyces saginatus* Syd.**

in Ann. Myc. 26 (1928) 132.

Teleutosori amphigenous ; single sori at first minute or of medium size, round or oblong, developing in series and becoming confluent and then 2 to 10 mm. long and 1 mm. broad ; compound sori finally developing concentrically and becoming lenticular in outline and up to 20 × 5 mm. Sori at first covered by the lead-coloured, raised epidermis, which ruptures and remains surrounding or partially veiling the pulverulent, rusty-brown spore masses. Teleutospores variable in form, subglobose, ovate, ellipsoid or oblong, almost always more or less angular, golden-brown, 28–52 × 20–35 μ, the majority 30–45 μ long ;

episore smooth, 5–8 μ thick, varying in thickness, the side or base—rarely the apex—being thicker than elsewhere. Pedicel hyaline, deciduous, ca. 6 μ thick and up to 55 μ long, slightly tinted at the apex.

on *Urginea altissima* Bkr., Heany Junction, Bulawayo, *Hopkins* (Rh. 5873).

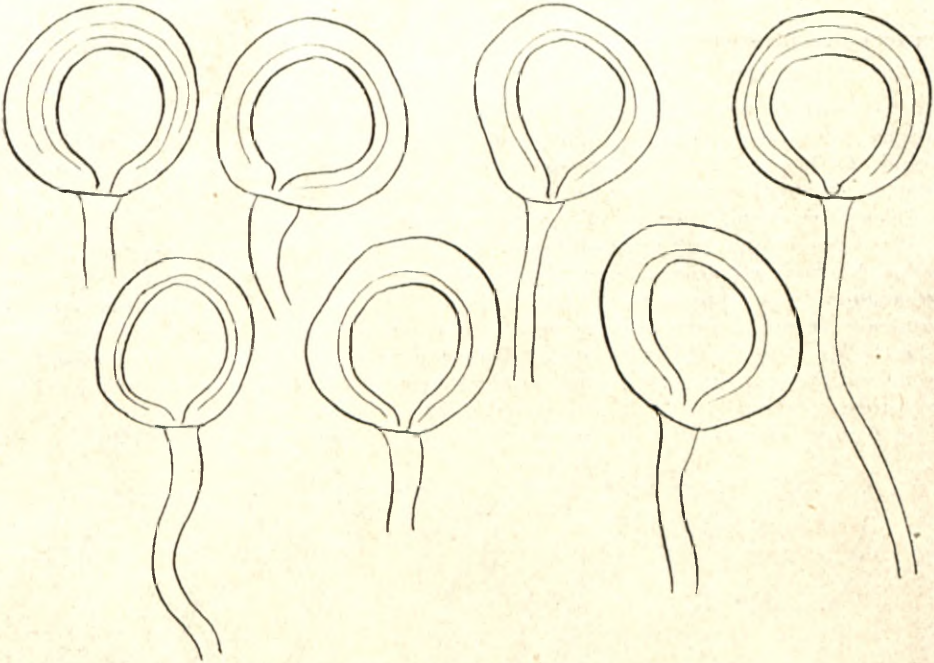


Fig. 13.—*Uromyces saginatus*. Teleutospores.

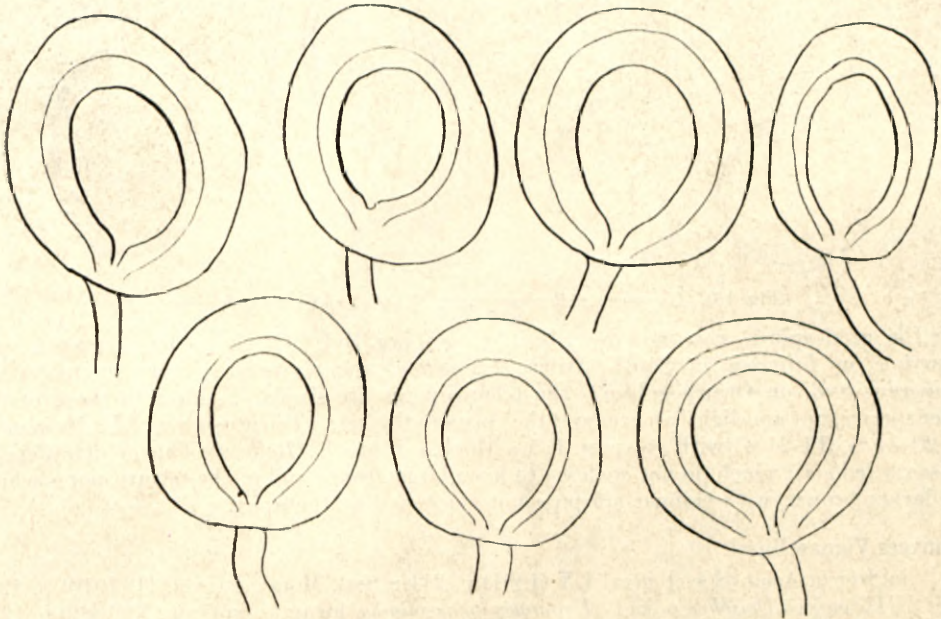


Fig. 14.—*Uromyces Holubii*. Teleutospores.

The type specimen, collected at Auros (Otavi) South West Africa, by Dinter (*K. Dinter 5673*) has not been seen, but the Bulawayo specimen is on the same host and conforms very closely to the original description. This species is similar to *Uromyces Holubii* Doidge, but the teleutospores are consistently smaller; drawings of the two rusts are reproduced for comparison, they appear to be distinct.

***Uromyces stellenbossiensis* v. d. Byl.**

in Duthie, Ann. Univ. Stell. VI A, No. 2 (1928) p. 4.

Uredo-sori similar to the teleuto-sori, but paler, or uredospores mixed with the teleutospores in the same sori. Uredospores subhyaline or pale yellow, ovate, subglobose or ellipsoid, $25-32.5 \times 20-25 \mu$; epispore thin, $1-1.5 \mu$ thick, very minutely verruculose echinulate and with several (ca. 7) small, scattered germ pores.

Teleutospores amphigenous, on elliptic, greenish-yellow leaf spots, elongated lenticular, at first pale, becoming dark purplish-brown, long covered by the raised epidermis. Teleutospores subglobose, ellipsoid, oblong, obovate or cuneate, sometimes asymmetrical or somewhat angular, golden-brown to chestnut-brown, $28-42 \times 18-28 \mu$; apex usually rounded, occasionally truncate, very rarely conical; base attenuate or rounded; epispore smooth, ca. 2μ thick, not thickened at the apex. Pedicel persistent, slightly tinted yellowish-brown, especially at the apex, up to 35μ long; either $5-6 \mu$ broad at the apex and tapering gradually downwards, or about 9μ thick, attenuated suddenly below to 4 or 5μ .

on *Urginea exuvata* Steinh., leaves, Stellenbosch, Duthie (v. d. Byl 2479).

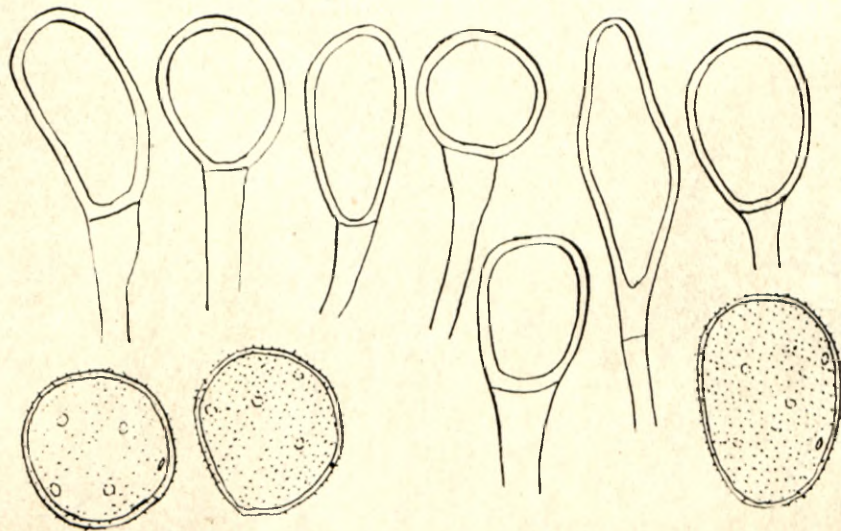


Fig. 15.—*Uromyces stellenbossiensis*. Uredo- and teleuto-spores.

The uredospores were not described by van der Byl. Of the other *Uromyces* spp. occurring on *Liliaceae* in South Africa, *U. stellenbossiensis* most closely resembles *U. Maireanus* Syd. on *Ornithogalum*; the teleutospores are similar in form to those of the latter species, but are slightly larger and the epispore thicker. Teleutospores of *U. Maireanus* are $20-34 \times 12-24 \mu$, with epispore 1.5μ thick. From *U. Bulbinis* Thuem. it differs in the scattered sori, which do not coalesce to form large groups and in the teleutospores which are darker brown, with thinner epispore not thickened at the apex.

***Uromyces Vignae* Barcl.**

in Journ. Asiat. Soc. Bengal LX (1891) p. 211; Syd. Monogr. Ured. II (1910) p. 124.

?*Uromyces Dolichi* Cooke (“*Uromyces phaseolorum* forma”) in Grev. X (1882) p. 127.

?*Aecidium* sp., Hopkins, Trans. Rhod. Sc. Ass. 35 (1938) p. 105.

Nigredo Vignae (Barcl.) Fromme, *Phytopath.* XLV (1924) p. 72.

Uromyces Vignae-luteolae P. Henn., *Ann. Mus. Congo* II (1907) p. 95.

Spermogonia epiphyllous, in small circular groups, honey-yellow, becoming brownish, globose or flattened-globose, 100–125 μ diam.; ostiolar filaments short.

Aecidia chiefly hypophyllous and petiocolous, in circular groups 2–4 mm. diam., often arranged in concentric rings, briefly cupulate, margin recurved, irregularly lacerate, 200–300 μ diam., Cells of the peridium rhomboid or oblong, slightly imbricated, 16–20 \times 20–25 μ , outer wall transversely striate, smooth, 3–5 μ thick, inner verrucose, 2–3 μ thick. Aecidiospores ellipsoid or oblong ellipsoid, 16–20 \times 20–29 μ ; wall colourless, 1–1.5 μ thick, closely and minutely verruculose.

Uredo-sori amphigenous and petiocolous, scattered, round to irregular, up to 1 mm. diam., early naked, chestnut-brown, surrounded by the ruptured epidermis. Uredospores ellipsoid or ovate-ellipsoid, 24–30 \times 18–22 μ , wall cinnamon-brown, 1.5–2 μ thick, finely and closely echinulate; germ pores 2, conspicuous, markedly super-equatorial.

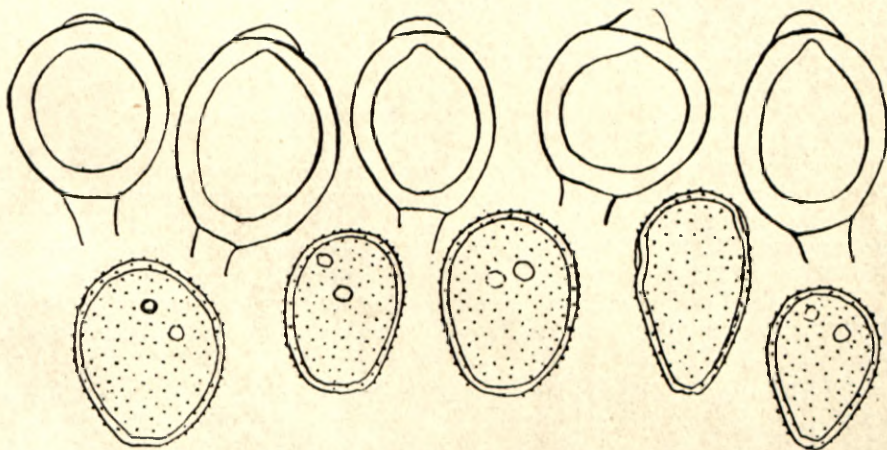


Fig. 16.—*Uromyces Vignae*. Teleuto- and uredo-spores.

Teleuto-sori amphigenous and petiocolous, ca. 0.5 mm. diam., blackish-brown, early naked, somewhat pulverulent, surrounded by the ruptured epidermis. Teleutospores broadly ellipsoid, 27–35 \times 20–25 μ , rounded or broadly conical at the apex, usually rounded at the base; epispore smooth, dark chestnut-brown, 2–2.5 μ thick, 4–6 μ thick at the apex, including the hyaline, hemi-spherical papilla. Pedicel hyaline, fragile, rarely equalling the spore in length.

on *Dolichos falciformis* E. Mey., Lemana, *Doidge*, 1827.

?*Dolichos gibbosus* Thunb., Somerset East, *MacOwan*; Durban, *Medley Wood* 40.

Dolichos lupiniflorus N.E.Br., Wellesley, S. Rhodesia, *Hopkins*, Rh. 2232; Mteptepa, Rh. 1849; Goromanzi, Rh. 4263.

Vigna stenophylla Burt Davy, Donkerpoort, *Doidge* and *Bottomley*, 30081.

Vigna unguiculata (Linn.) Walp., Nelspruit, *Liebenberg*, 26069; Cedara, *Staples*, 15432; Bathurst, *Preddy*, 20426; Glendale, Rh. 1248, Kew.

Vigna sp., Wellesley, Rh. 2249, Rh. 2233; Rusapi, Rh. 4498.

Fromme (l.c.) pointed out that the rust on cowpea and related hosts is distinct from *Uromyces appendiculatus* on *Phaseolus* spp. The most distinct difference is the position of the germ pores in the uredospores; in *U. appendiculatus* they are two, equatorial and not easily seen; in *U. Vignae* their position is distinctly super-equatorial and they are readily distinguished. The teleutospores are similar, but those on cowpea have slightly

thinner walls and less apical thickening; they germinate immediately and those of the bean rust germinate only after a long ripening period. Drawings of spores of both species are reproduced for comparison.

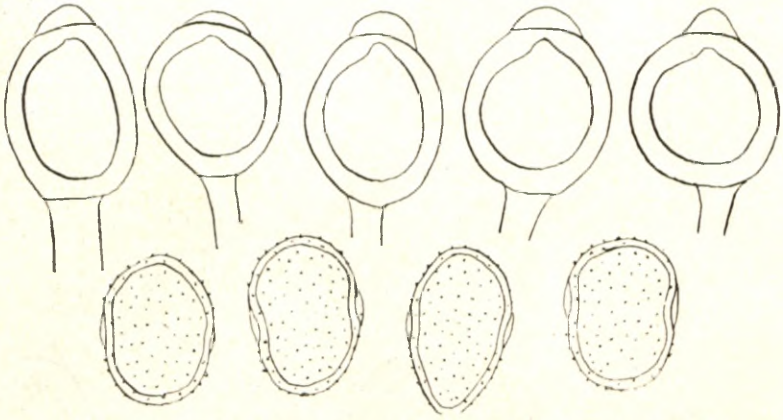


Fig. 17.—*Uromyces appendiculatus*. Teleuto- and uredo-spores.

These differences, with the exception of those observed in the germination of the teleuto-spores, for which fresh material would have been necessary, were found in the South African rusts on *Vigna* and *Dolichos*.

The aecidium (Rh. 2232, 2249, 1849) differs little from the diagnosis given by Fromme; Nos. Rh. 2232 and 2233 (Teleuto- and aecidia) were collected from separate plants growing within a few yards of each other. It seems probable that they are stages in the same rust. This aecidium seems to differ from *Aecidium Vignae* Cooke and has not been found in the Union.

I am indebted to Dr. Hopkins for the opportunity of examining the Rhodesian specimens quoted, and for material of several other Rhodesian rusts described in this paper.

Uropyxis Gerstneri Doidge nov. spec.

Teleutosori plerumque hypophylli, pauci aggregati, deinde greges irregulares majores usque 5 mm. metientes formans, minuti, mox nudi et pulverulenti, epidermide lacerata cincti, atro-brunnei. Teleutosporae castaneo-brunneae, oblongae, utrinque late rotundatae, haud incrassatae, septo verticali praeditae, medio vix constrictae, $25-32 \times 19-25 \mu$, episporio $1.5-2 \mu$ crasso, superficie aculeis subhyalinis v. brunneolis ad apicem 2-3 dentatis rarius simplicibus, $1.5-2 \mu$ interdum usque 4μ longis, densiuscule et irregulariter obsitis; poris germinationis binis in quoque loculo praeditis; pedicello leniter colorato persistenti, $25-60 \mu$ longo ad apicem $4-5 \mu$ crasso, inferne inflato, ca. 7.5μ crasso.

Hab. in foliis *Annonaceae* indet., False Bay, Zululand, leg. Gerstner, 34564.

Sori mostly hypophyllous, at first single or in small, close groups; later forming larger, more loosely connected, irregularly radiating groups up to 5 mm. diam. Single sori dark brown, minute, more or less circular in outline, 0.2-0.5 mm. diam., sometimes coalescing to form larger sori, surrounded by the torn epidermis, becoming loosely pulverulent. On the upper side of the leaf there is a depression in the leaf tissues above each sorus and thus are etched in the leaf surface irregularly radiating, branching lines; the leaf tissues are somewhat discoloured but there are no definite leaf spots. Occasionally a few sori develop on the upper side of the leaf, opposite those on the lower surface.

Teleutospores chestnut-brown, 2-celled, oblong, very broadly rounded at both ends, barely constricted at the septum, which is usually vertical, rarely oblique and only very occasionally transverse, rarely somewhat irregular in form and asymmetrical through

mutual pressure, $25-32 \times 19-25 \mu$, mostly $25 \times 20 \mu$. Epispore $1.5-2 \mu$ thick, rather uneven in thickness but not thickened at the apex, bearing numerous aculeae, irregularly placed, but usually more numerous on the side remote from the pedicel. Aculeae hyaline or slightly tinted, $2-2.5 \mu$ or occasionally up to 4μ long, sometimes tapering from a base about 1μ broad to a simple, obtuse apex; most frequently 2-3 dentate at the apex, or with spreading branches up to 1μ long. Germ pores 2 in each cell. Pedicel slightly tinted, $25-60 \mu$ long; upper portion smooth, thick-walled, $4-5 \mu$ thick, the lower part inflated and somewhat club-shaped, ca. 7.5μ thick, rough, tuberculate.

on leaves of *Annonaceae* undet., False Bay, Zululand, *Gerstner* 4817, 34564.

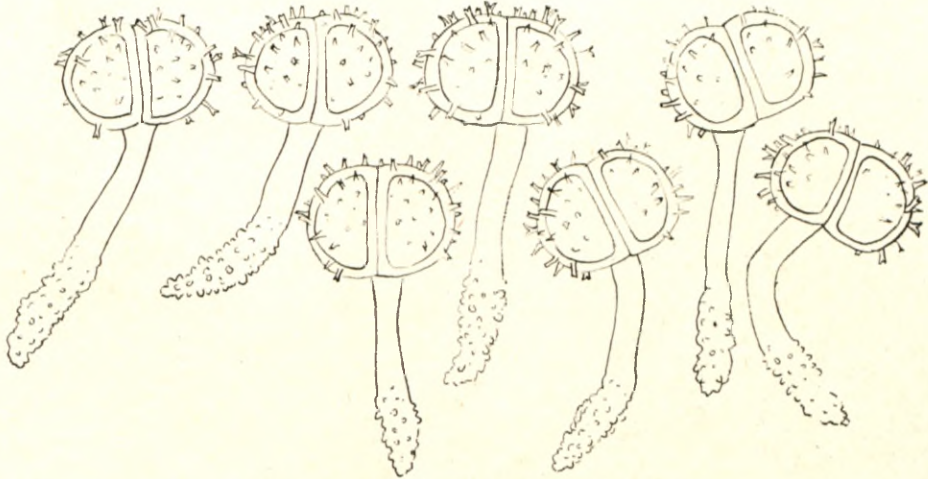


Fig. 18.—*Uropyxis Gerstneri*. Teleutospores.

***Uropyxis Steudneri* P. Magn.**

Ber. Deutsch. Bot. Ges. X (1892) p. 193 and XVII (1899) p. 119.

Dietel in Engl. and Prantl, Die naturlich. Pflanzenfam., 2 Aufl. (1928) Bd. 6, p. 65.

Diorchidium Steudneri P. Magnus, Ber. Deutsch. Bot. Ges. IX (1891) p. 91. Taf. V.

Puccinia Steudneri (P. Magn.) Dietel, Prings. Jahrb. XXVI (1894) p. 81, Taf. XIV,

Fig. 2. Syd. Monogr. Ured. I (1904) p. 841, Tab. XLIV, F. 562.

Var. *rhodesica* Doidge nov. var.

A typo differt teleutosporis majoribus, $50-65 \times 37.5-45 \mu$, septo plerumque horizontali et tegumento pallide fusco.

Hab. in foliis petiolisque *Ormocarpi trichocarpi*, Inyati, leg. Hopkins (Rh. 5990)

Spermatogonia epiphyllous, opposite the hypophyllous teleuto-sori, in small groups, sometimes surrounded by teleuto-sori, honey-yellow, lenticular, ca. $150-200 \mu$ diam.

Teleuto-sori amphigenous and petiolicolous, but most frequent and extensive on the lower surface of the leaf; from about 0.5 mm. diam., varying in size and often covering the whole under surface of the leaflet, up to $3 \times 1.5 \text{ mm.}$, or on petioles becoming elongated up to 3 mm. long and 0.5 mm. broad, dark brown, firm, pulvinate, early becoming naked, surrounded by the torn epidermis. Teleutospores broadly elliptical, broadly rounded at both ends, not constricted at the septum, $50-65 \times 37.5-45 \mu$ (when dry, $45-60 \times 30-37.5 \mu$). Wall laminate, minutely or rather distinctly verrucose; verrucae ca. $1-1.5 \mu$ long, obtusely conical and irregularly placed, about $3-5 \mu$ distant from one another; inner layer chestnut-brown, $2.5-4 \mu$ thick, outer pale fuscous, swelling when wet to a thickness of $4-7.5 \mu$, but mostly 5μ thick; septum horizontal (ca. 50 per cent.), oblique (ca. 36 per cent.) or vertical

(ca. 14 per cent.); germ pores lateral, two in each cell. Pedicel persistent, up to $180\ \mu$ long, hyaline, $6\text{--}9\ \mu$ broad; at first cylindrical throughout, when spores are mature, swelling just below the spore into a globose vesicle $20\text{--}25\ \mu$ diam.; this bursts in water, setting free the spore.

on leaflets and petiole of *Ormocarpum trichocarpum* (Taub.) Harms, Inyati, S. Rhodesia June 1943, *J. C. Hopkins* (Rh. 5990).

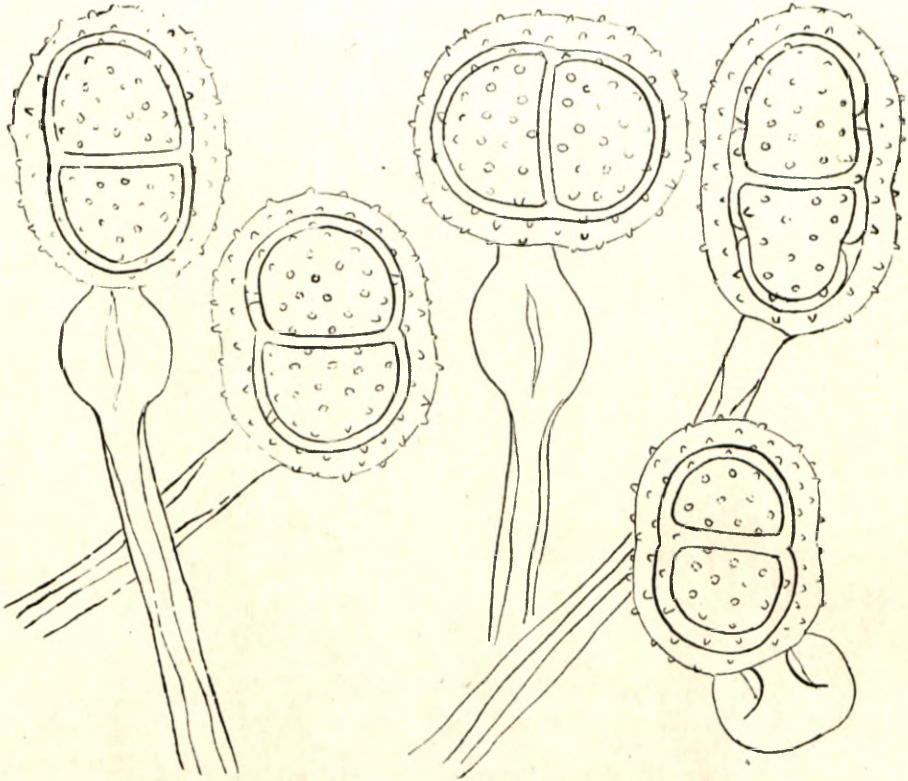


Fig. 19.—*Uropyxis Steudneri* var. *rhodesica*. Teleutospores.

The type was described by Magnus (1891 l.c.) as *Diorchidium Steudneri* on *Ormocarpum bibrachiatum* Bkr. from Abyssinia; later he transferred this rust to the genus *Uropyxis*. He gave the average measurements of the teleutospores as $44.4 \times 36\ \mu$; *vide* Sydow l.c., the limits of size are $40\text{--}52 \times 35\text{--}40\ \mu$. In the type the septum is usually vertical as in the genus *Diorchidium* and the outer envelope of the spore hyaline.

The variety differs in the consistently larger spores, predominantly horizontal or oblique septum and pale, fuscous outer envelope.