Taxonomic Notes on Asiatic Smuts. — I.

By Lee Ling (Washington).

The present notes aim at a revision of the Ustilaginales of Asia and adjacent Pacific Islands. While examining the collections of this group of fungi from that area in various herbaria, it became evident that a number of species had been described without adequate ground for their distinction from the old established ones and consequently have been placed in synonymy here. In other cases, incorrect identifications have resulted in the misunderstanding of the geographic distribution of certain species. Included here are also the collections which have been proved to be previously undescribed or to furnish new or noteworthy information

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Tilletia vittata (Berk.) Mundk., Trans. Brit. Myc. Soc. 24: 312. 1940. Syn.: *Tilletia panici* Mundk., Trans. Brit. Myc. Soc. 24: 317. 1940.

On *Oplismenus compositus* (L.) Beauv., Parasnath, Bihar, India, J. D. Hooker, type (NY) [1]); Calcutta, India, Jan. 1928, K. Bagchee, type of *T. panici* (ND).

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[1]) Herbaria where the specimens are located are referred to according to the following abbreviations: BPI = Mycological Collections, Bureau of Plant Industry, U. S. Department of Agriculture; CONN = Connecticut Agricultural Experiment-Station, New Haven; FH = Farlow Herbarium, Harvard University; ND = Indian Agricultural Research Institute, New Delhi; NY = New York Botanical Garden; US = U. S. National Herbarium. Wherever the location is not given, the specimen is in the writer's personal collection.

The spores of this species are ornamented with very fine scales which measure 1—2 μ long and 0,5—0,8 μ wide at base. Similarly ornamented immature spores and smooth sterile cells of various sizes are intermixed with the spores.

Entyloma australe Speg., Anal. Soc. Cien. Argent. 10: 5. 1880.

On *Physalis* sp., En Thap, Tonkin, Indo-China, Apr. 1888, B. Balansa, Champignons du Tonkin No. 4 (FH).

Ustilago dehiscens Ling. sp. nov.

Soris in acheniis, embrya endosperma et cotyledones omnino destruentibus, externe a plantis sanis non distinguentibus, a pericarpiis nitidis nigris usque ad maturitatem circumdatis, cum pericarpia ad apices dehiscunt tum massa pulverulenta sporarum disseminatur; sporis plerumque subglobosis, saepe subangularibus, 8—11 ⇌ 7,3—9 μ; episporio echinulato, purpureo; sporis immaturis in statibus variis evolutionis generaliter hyalinis, crasse tunicatis, asperatis vel glabris.

Sori in the achenes, completely destroying the embryos, endosperms and cotyledons, externally indistinguishable from the healthy ones, enclosed by shining blackish pericarps till maturity, when the pericarps dehisce at apexes permitting the dissemination of the dusty spore mass. Spores mostly somewhat angular, often subglobose, 8—11 ⇌ 7,3—9 μ; epispores echinulate, purple; immature spores of different developmental stages present, usually hyaline, thick-walled, echinulate or smooth.

On *Polygonum amplexicaule* D. Don, Kashmir, alt. 10,000 ft., India, Aug. 23, 1921, R. R. Stewart 6758, type (BPI, NY).

Enclosed in the specimen in the New York Botanical Garden is a note by the late G. P. Clinton: "This species seems to have smaller spores than *Sphacelotheca hydropiperis* thus placing it near var. *borealis*. On the other hand it is difficult to find a sorus. The reason for this is the sori are produced within the seeds and are disclosed only as they split open at their apexes into the shining three valves. Thus there is or no evidence of a false membrane, apparently no columella, and few if any sterile cells. Look up further. Apparently no such smut reported on this specific host."

This species is interesting in that the presence of the fungus actually modifies the function of the pericarp. In *Polygonum*, as a rule, the pericarps of the healthy fruits are hardened and indehiscent at maturity. In the diseased fruits, the dehiscence of pericarp may forcibly eject the spores into air current, thus facilitating their dissemination.

Ustilago kusanoi Syd., Mém. Herb. Boiss. 4: 4. 1900.
Syn.: *Ustilago morobiana* Zundel, Mycologia 36: 402. 1944.

On *Miscanthus floridulus* (Labill) Warb., Boana, alt. 3,000 ft., Morobe, New Guinea, July 25, 1940, M. S. Clemens, type of *U. morobiana* (BPI).

Zundel states that *U. morobiana* differs from *U. kusanoi* in having a different type of sorus, with slightly larger and darker spores. After examining the type of the former, however, it becomes evident that the characters of the sorus are identical and the size and color of spores are well within the range of variability of *U. kusanoi.*

Ustilago polytocae-barbartae Mundk., Trans. Brit. Myc. Soc. 24: 314. 1940.

On *Polytoca macrophylla* Benth., Morobe, New Guinea, Oct. 10, 1939, M. S. Clemens 10759 (BPI).

Ustilago sporoboli-indici Ling, Myc. Papers I. M. I. 11: 7. 1945.

On *Sporobolus indicus* (L.) Br., Banguio, alt. 5,000 ft., Benguet Prov., Luzon, P. I., March 16, 1935, M. S. Clemens (BPI).

A speciem labelled *Ustilago schlechteri* P. Henn. (Myc. Herb. Dept. Agr. Un. S. Africa 11644), which Zundel (10) incorrectly cited as its type, agrees well with *U. sporoboli-indici,* but differs considerably from P. Hennings' description in spore size. Although these two species are possibly identical, it seems advisable to retain both until the type of *U. schlechteri* is examined. The Philippine collection has almost smooth spores, but is otherwise identical.

Sphacelotheca andropogonis-annulati (Bref.) Zundel, Mycologia 22: 132. 1930.

On *Andropogon caricosus* L., Hanoi, Tonkin, Indo-China, Nov. 1923, A. Pételot.

This collection was reported by Pételot (6) as *Sphacelotheca ischaemi* (Fckl.) Clint. on *Andropogon intermedius* R. Br.

Sphacelotheca hydropiperis (Schum.) D. By., Verg., Morph. Biol. Pilze 187. 1884.

On *Polygonum caespitosum* Bl. var. *longisetum* (De Bruyn) Steward, Lembang, Java, 1912, Backer 2463 (BPI).

This was reported by Ciferri (1) as *Ustilago punctata* Clint.

Sphacelotheca indehiscens Ling, sp. nov.

Soris in spiculis cylindricis, 5—8 mm. longis, 1—1,5 mm. latis, ex parte glumis tectis, soro quoque membrana falsa griseobrunnea 78—165 μ crassa tecto, hac membrana plerumque indehiscente, e stratibus decem vel pluribus cellularum sterilium firme cohaerentium compo-

sita; cellulis sterilibus subglobosis usque angularibus, hyalinis, 6—10.5 μ diam., tunica 1—1.5 μ crassa; columella inconspicua, singula, eramosa, soris multum breviore; sporis subglobosis, ellipsoideis vel subangularibus, guttulatis, 12.7—18 ⇌ 11.2—13.5 μ, med. 14.1 ⇌ 12.7 μ: episporio rubrobrunneo, semiopaco, subtiliter foveolato, circa 1 μ crasso.

Sori in the spikelets, cylindrical, 5—8 mm. long, 1—1.5 mm. wide, partially concealed by the glumes, each enclosed by a grayish brown false membrane 78—165 μ thick, composed of 10 or more layers of firmly united sterile cells, usually indehiscent; sterile cells subglobose to angular, hyaline, 6—10.5 μ diam., wall 1—1.5 μ thick; columella inconspicuous, single, unbranched, much shorter than the sori. Spores subglobose, ellipsoid to slightly angular, 12.7—18 ⇌ 11.2—13.5 μ, averaging 14.1 ⇌ 12.7 μ, guttulate; epispores deep reddish brown, semi-opaque, finely pitted under oil immersion, approximately 1 μ thick.

On *Themeda gigantea* (Cav.) Hack., M. Buysman, Lawang, Java, intercepted at Inspection House, Washington, DC., April 20, 1916. J. T. Rogers, type (BPI).

The indehiscent character of this fungus appears to prevent the dissemination of its spores by wind as commonly found in *Sphacelotheca*. Probably the spores escape only trough the disintegration of the false membrane after the smut galls have fallen on the ground.

Sphacelotheca ischaemicola Ling, sp. nov.

Soris in ovariis, attenuatis, primum glumis tectis, deinde paulo protrudentibus, 3—4 mm. longis, soro quoque primum membrana falsa brunnescenti cincto, eaque in cellulas hyalinas, subglobosas vel oblongas 7—16,5 ⇌ 6—13,5 μ dehiscente; columella centrali, prominenti, simplici; sporis praecipue globosis vel subglobosis, 10,3—13,5 ⇌ 9,4—12,7 μ; episporio rubro-brunneo, subopaco, distincte echinulato, 0,7 μ crasso.

Sori in the ovaries, tapering, concealed first by the glumes, then slightly protruding, 3—4 mm. long, each at first enclosed by a brownish false membrane which breaks up into hyaline sterile cells, subglobose to oblong, 7—16,5 ⇌ 6—13,5 μ; columella central, prominent, simple. Spores chiefly globose to subglobose, 10,3—13,5 ⇌ 9.4—12,7 μ; epispores deep reddish brown, subopaque, distinctly echinulate, 0,7 μ thick.

On *Ischaemum timorense* Kunth, Botanic Gardens, Singapore, Jan. 21. 1948, R. E. Holttum, type; on *Ischaemum digitatum* Brongn., Morobe, New Guinea, Jan. 23, 1939, M. S. Clemens 10265 (BPI).

This is an intensified form of *Spacelotheca tanglinensis* (Tracy & Earle) Zundel, from which it differs in having larger and darker spores, more distinct and coarser echinulations, and longer and more prominent columella.

Sphacelotheca ophiuri (P. Henn.) Ling, comb. nov.

Syn.: *Ustilago ophiuri* P. Henn., in O. Warburg's Monsunia 1: 1. 1899.
Ustilago flagellata Syd., Ann. Myc. 9: 144. 1911.
Sphacelotheca flagellata Zundel, Bothalia 3: 301. 1938.
Sphacelotheca ophiuri-monostachydis Tai apud Ling, Myc. Papers I. M. I. 11: 8. 1945.

On *Ophiurus exaltatus* (L.) Kuntze, Java, Feb. 1884, O. Warburg, type (CONN); on *Rottboellia exaltata* L. f., Rizal Prov., Luzon, P. I., Dec. 1909, E. D. Merrill 7068, type of *U. flagellata* (BPI); on *Ophiurus monostachys* J. S. Presl, Wenshan, Yunnan Prov., China, Aug. 11, 1938, T. H. Wang & S. T. Chao.

The type of this species has agglutinate, globose to oval spores measuring 10—14 μ in diameter, with smoky reddish brown, verruculose epispores. Groups of hyaline sterile cells decomposed from the false membrane are intermixed with the spores. It agrees well with *S. ophiuri-monostachydis* and several collections from the Philippine Islands known as *U. flagellata*. The only variation is that the type collection has spores with slightly less pronounced verruculation than the others and the Chinese collection has spores more irregular in shape. *Ophiurus* and *Rottboellia* are two very closely related genera.

Sphacelotheca penniseti-japonici (P. Henn.) S. Ito, Trans. Sapporo Nat. Hist. Soc. 14: 91. 1935.

Syn. *Ustilago penniseti* Rab. var. *tokinensis* Pat., Jour. de Bot. 4: 57. 1890.

On *Pennisetum alopecuroides* (L.) Spreng., Montagne des elephantes, Tonkin, Indo-China, Jan. 9, 1886, B. Balansa, type of *U. penniseti* var. *tonkinensis* (FH).

Pételot (6), based upon Patouillard's determination, reported *Ustilago penniseti* from Tonkin. According to his description of spore characters, it is apparently also *S. penniseti-japonici*.

Sphacelotheca polytriadis (Mass.) Ling, comb. nov.

Syn. *Ustilago polytriadis* Mass., Kew Bull. 1911: 224. 1911.

Sori in the ovaries, 1—2 mm. long, each first covered by a thin brown false membrane composed of hyaline thin-walled sterile cells, 7,5—16,5 ≒ 6—10 μ; columella central, simple, delicate. Spores globose to oval, often more or less angular, 10,5—14,5 ≒ 9,5—12,5 μ; epispores smooth, deep reddish brown, 1 μ or less thick.

On *Polytrias praemorsa* (Nees) Hack., Wack-Wack Country Club, Manila, Luzon, P. I., Sept. 10, 1945, C. T. Rogerson 611 (BPI).

Sphacelotheca pulverulenta (Cke. & Mass.) Ling, comb. nov.

Syn. *Cintractia pulverulenta* Cke. & Mass. apud Cke., Grevillea 18: 34 1889.

Ustilago (?) *pulverulenta* Cif., Ann. Myc. 26: 33. 1928.
Ustilago pulverulenta Boed., Bull. Jard. Bot. Buitenz. III. 13: 485. 1935.

On *Saccharum* sp., Nungklao, Khasi Hills, Assami, India, May 28, 1886, C. B. Clarke 44069, type (NY).

In spite of the agglutinate spore mass, the presence of a light brownish false membrane and a central simple collumella indicates that this species belongs to *Sphacelotheca*. The false membrane upon pressure breaks up into groups of sterile cells measuring 9,5—13,5 μ in diameter.

Sphacelotheca rhaphidis Ling, sp. nov.

Soris inflorescentias destruentibus, ellipsoideis, utrinque attenuatis, 1 cm longis vel minoribus, partim vaginis foliorum tectis; soro quoque membrana falsa brunnea subcrassa, maturitate dehiscenti, massam pulverulentam sporarum et fila pluria simplicia matricis ostendenti tecto; cellulis membranae sterilibus bene concretis, hyalinis, tenuiter tunicatis, anguste elongatis usque subglobosis, magnitudine variabilibus; sporis saepe in statu juvenili laxe aggregatis, globosis ovoideisve, 6,7—9 μ diam.; episporio flavo, glabro.

Sori destroying the inflorescence, narrowly ellipsoidal, tapering at both ends, 1 cm. or less long, partially concealed by the leaf sheaths, each enclosed by a brown, rather thick false membrane which ruptures later disclosing a dusty spore mass surrounding several simple strands of host tissue; sterile cells of the false membrane firmly united, hyaline, thin-walled, narrowly elongate to subglobose, variable in size. Spores often loosely united at an early stage, globose to oval, 6,7—9 μ diam.; epispores yellow brown, smooth.

On *Rhaphis aciculatus* Retz., Wack-Wack Country Club, Manila, Luzon, P. I., Sept. 10, 1945, C. T. Rogerson 662, type (BPI).

Sphacelotheca tanglinensis (Tracy & Earle) Zundel, Mycologia 36: 406. 1944.

Syn. *Ustilago arthraxonis* Pat., Jour. de Bot. 11: 346. 1897.

On *Ischaemum ciliare* Retz., Duy Thinh, Thanh Hoa, Tonkin, Indo-China, Feb. 26, 1892, R. P. Bon 9204 (FH); also Jan. 21, 1893, R. P. Bon 9844, cotype of *U. arthraxonis* (FH); on *Ischaemum aristatum* L. var. *gibbum* Hack., Caloocan, Rizal Prov., Luzon, P. I., Nov. 20, 1909, C. B. Robinson.

The host of *U. arthraxonis* was incorrectly determined as *Arthraxon*, which was probably the basis for Patouillard's description of it as a new species.

The Philippine collection was reported by Graff (2), based upon the determination of Bresadola, as *Ustilago tonkinensis* (P. Henn.) Sacc. The same binomial was used by Reinking (7) for the collec-

tions from Kwangtung, China on *Ischaemum ciliare* and *I. aristatum.* In Reinking's collection, now in the Mycological Collections, Bureau of Plant Industry, U. S. Department of Agriculture, the smut on *Ischaemum,* however, is represented by only one specimen which was identified and reported by Sydow (8) as *Ustilago tonglinensis.* It is assumed that this is the same collection what Reinking referred to as *U. tonkinensis* before it was identified by Sydow.

The application of the binomial *Ustilago tonkinensis* has been altogether a long perpetuated mistake. *Uredo tonkinensis* P. Henn. was described originally as a leaf rust on *Andropogon.* Hennings' (3) description follows:

"Maculis rufobrunneis, amphigenis, soris hypophyllis ellipticis vel elongatis, gregariis, diutius tectis, epidermidem longitudinaliter erumpentibus, rufobrunneis; uredosporis ovoideis subglobosis, ellipsoideis vel piriformibus, laete brunneis, minute verrucosis 20—28 ⇌ 16—26 μ; paraphysibus clavatis vel lagenariiformibus, hyalinis 45—60⇌15—25 μ. Hanoi: Auf Blättern von Andropogon sp."

In Saccardo's Sylloge Fungorum (11: 232) the name *Uredo tonkinensis* is inserted with the genus *Ustilago,* but only in the index of the same volume it is changed to *Ustilago tonkinensis.* It is very probably due to an unintentional error. Zundel (9) also gave a description of *Sphacelotheca tonkinensis* (P. Henn.) Zundel. Since he did not cite the specimens examined, it is difficult to know what he really referred to. In comparing Hennings' description with Zundel's, one would be at a loss to understand how a leaf fungus with paraphyses could ever be confused with an ovaricolous smut.

Cintractia axicola (Berk.) Cornu, Ann. Sci. Nat. Bot. VI. 15: 279. 1883.

On *Fimbristylis monostachya* (L.) Hassk., Wack-Wack Country Club, Manila, Luzon, P. I., Sept. 30, 1945, C. T. Rogerson 686 (BPI).

Cintractia disciformis Liro, Ann. Bot. Soc. Zool.-Bot. Fenn. Vanamo 6: 6. 1935.

On *Carex haematostoma* Nees, Mt. Sawi, alt. 13,000 ft., Sonamarg, Kashmir, India, Aug. 19, 1922, R. R. Stewart 7356 (US).

This form is sufficiently distinct from *Cintractia caricis* (Pers.) Magn. to be considered as a separate species. It was described originally on *Carex hirtella* Drejer, a very close relative of *C. haematostoma.* It has spores very regular in size and shape, measuring 16—20 μ in length and appearing subglobose to broadly oval, but usually strongly compressed at both sides. The epispores are dark reddish brown, smooth and 1,2 μ thick.

Farysia butleri (Syd.) Syd., Ann. Myc. 17: 42. 1919.
Syn.: *Farysia caricis-filicinae* S. Ito, Trans. Sapporo Nat. Hist. Soc. 14: 91. 1935.

On *Carex cruciata* Wahl., Thurya, Assam, India, May 16, 1905, E. J. Butler 349, type (CONN); Syndai, Assam, India, Jan. 1915, L. S. Money (BPI); on *Carex cruciata* Wahl. var. *agrocorpus* C. B. Clarke, between Tengyueh and Burmese border, en route to Sadon, Yunnan Prov., China, Nov. 1922, J. F. Rock 7275 (US); on *Carex* sp., Sichang, Sikang Prov., China, 1300—1500 m., 1914, H. Handel-Mazzetti 1089.

While examining the asiatic collections of *Farysia*, it was found that *F. butleri* differs in no way from *F. caricis-filicinae* commonly found in South China and that the hosts are the same. Dr. R. S. Vasudeva of the Indian Agricultural Research Institute kindly had the host of the type of the former indentified as *Carex cruciata*, thus confirming the writer's view. The type collection has strongly areolate spores with verrucae arranged regularly in striae. Another Indian collection by L. S. Money, however, has only slightly areolate spores, resembling those usually found in this species. The areolation of spores appears to be an effect of aging.

The Handel-Mazzetti collection was reported by Keissler (4) as *Ustilago flavo-nigrescens* Berk. & Cke. on *Carex baccans*. Both the fungus and the host were incorrectly named.

Farysia orientalis Ling, sp. nov.

Soris ovaria destruentibus, 3—12 mm. diam.; soro quoque e membrana crassa, brunnescenti prosenchymatica, postea dehiscenti et massam sporarum nigro-avellaneam et fasciculos conspicuos hypharum detegenti tecto; fasciculis hypharum numerosissimis et profusis, olivaceis, 7,5—20 μ crassis, ex hyphis pluribus tenuibus compositis; sporis quoad formam et magnitudinem variabilibus, globosis, ovalibus, ovoideis, pyriformibus vel lenticularibus, utrinque elongato-attenuatis, 4—6,7 μ in diam., vel 5—9,5 $\rightleftharpoons$ 4—8 μ, plerumque elongatis usque 17 μ, saepe globula centrali praeditis, interdum areolatis; episporio olivaceo-brunneo, striato, verrucoso.

Sori destroying the ovaries, 3—12 mm. diam., each covered by a thick, brownish fungous membrane of prosenchymatous tissue which later disintegrates revealing a "Chaetura Drab" to "Chaetura Black" (Ridgway) mass of spores and conspicuous fascicles of hyphae. Fascicles very abundant and profuse, olivaceous, 7,5—20 μ wide, composed of a number of fine hyphae. Spores variable in shape and size, globose, oval, ovoid, pyriform, or lenticular with elongated tapering ends, 4—6,7 μ diam., or 5—9,5 $\rightleftharpoons$ 4—8 μ, most elongated ones up to 17 μ,

frequently with an evident central globule, areolate in some cases; epispores olive brown, striate-verrucose.

On *Carex baccans* Nees, Ootacamund, India, Oct. 24, 1911, C. V. Pipers, type (BPI); West Hill, Kunming, Yunnan Prov., China, Dec. 1938, F. L. Tai & C. C. Cheo; Saw Chaung, Chin Hills, Burma, April 1939, F. G. Dickason 8557 A (BPI); Hakagala, Ceylon, May 1912, T. Petch (Syd., Fg. exot. exs. 237, sub *Ustilago endotricha* Berk.)

This species is characterized by the large size of the sori, profuse development of the hyphal fascicles and wide variation in spore size. The color of the mass of spores and fascicles is much deeper than that of *Farysia olivacea* (DC.) Syd.

Sorosporium chamaeraphis Syd. apud Syd. & Petr., Ann. Myc. 26: 431. 1928.

On *Pseudoraphis brunoniana* Griff., Wack-Wack Country Club, Manila, Luzon, P. I., Aug. 10, 1945, C. T. Rogerson 642 (BPI).

Sorosporium crypticum (Cke. & Mass.) Ling, comb. nov.

Syn.: *Cintractia cryptica* Cke. & Mass. apud. Cke., Grevillea 18: 34. 1889.
Ustilago (?) *cryptica* Cif., Ann. Myc. 26: 33. 1928.

Sori in the ovaries, cylindrical, tapering, 3—6 mm. long, each first enclosed by a pallid false membrane composed of subglobose to rectangular sterile cells, 9—16,5 ⇌ 6—15 μ, later the membrane ruptures from the apex disclosing a granular black spore mass surrounding a central simple columella. Spore-balls rather permanent, almost opaque, 37—60 ⇌ 30—50 μ, many-spored. Spores subglobose to oval, mostly angular; outer spores dark reddish brown, semi-opaque, echinulate, echinulation more distinct on free surfaces, 13,5—20,5⇌9—15 μ, epispores approximately 2 μ thick; inner spores lighter colored to almost hyaline, slightly smaller in size, epispores thinner, smooth.

On *Eulalia argentea* Brongn. (= *Pollinia argentea* Trin.), Munepore, India, C. B. Clarke, type (NY).

Sorosporium eriachnes Thuem., Flora 61: 443. 1878.

On *Eriachne pallescens* R. Br., outskirts of Alaminos, Pangasinan Prov., Luzon, P. I., April 13, 1928, M. S. Clemens (BPI).

Sorosporium cynodontis Ling, sp. nov.

Soris inflorescentias totas involventibus, cylindricis, utrinque attenuatis, 0,6—2 cm. longis, 2—3 mm. latis, vaginis foliorum partim tectis; soro quoque membrana falsa, tenui, delicatula, griseo-alba, mox dehiscenti et massam sporarum subagglutinatam filaque pluria tenuia matricis detegenti cincto; cellulis sterilibus membranae falsae plerumque catenulatis, hyalinis, subglobosis vel oblongis, tenuiter tunicatis,

7,5—18,5 ⇌ 6—14 μ; glomerulis sporarum evanescentibus, subglobosis, ellipsoideis oblongisve, opacis, 40—78 ⇌ 30—52 μ; sporis globosis vel late ellipsoideis, saepe subangularibus, 10,5—16,5 ⇌ 9—13,5 μ; episporio rubro-brunneo, verrucoso, circa 1,5 μ crasso; sporis interioribus pallidioribus.

Sori involving the entire inflorescence, cylindrical, tapering at both ends, 0,6—2 cm. long, 2—3 mm. wide, partially concealed by the leaf sheaths, each covered by a thin, delicate, grayish white false membrane which disintegrates early revealing a dark, semi-agglutinate spore mass surrounding several fine strands of host tissue; sterile cells of the false membrane chiefly in chains, hyaline, subglobose to oblong, thin-walled, 7,5—18,5 ⇌ 6—14 μ. Spore-balls evanescent, subglobose, ellipsoid or oblong, opaque, 40—78 ⇌ 30—52 μ. Spores globose to broadly ellipsoid, often somewhat angular, 10,5—16,5 ⇌ 9—13,5 μ; epispores deep reeddish brown, verrucose, approximately 1,5 μ thick; inner spores lighter in color.

On *Cynodon dactylon* (L.) Pers., Station Maria, Bulacan Prov., Luzon, P. I., Nov. 1924, M. S. Clemens 4863, type (BPI).

Sorosporium flagellatum Syd. & Butl., Ann. Myc. 5: 489. 1907.
Syn.: *Ustilago burmanica* Syd. & Butl., Ann. Myc. 10: 250. 1912.

On *Ischaemum ? ciliare* Retz., Noesa Kambangan, Java, Feb. 1931, K. B. Boedijn 1126 (BPI); on *Ischaemum timorense* Kunth, Kya-in, near Moulmein, Burma, Jan. 9, 1908, E. J. Butler 1426, type of *U. burmanica* (BPI, CONN).

The collection from Java was reported by Ciferri (1) as *Ustilago rabenhorstiana* Kuehn. The spores of *U. burmanica* are verruculose, but not smooth as originally described. Its spore-balls are surrounded by mycelial strands which become gelatinized at maturity.

Sorosporium formosanum (Saw.) Saw., Dept. Agr. Gov't. Res. Inst. Formosa Rep. 35: 29. 1928.
Syn.: *Ustilago digitariae* Rab. f. *panici-repentis* Kuehn, Hedwigia 15: 5. 1876.
Ustilago amadelpha Syd. & Butl var. *glabriuscula* Cif., Nuovo Giorn. Bot. Ital. 40: 255. 1933.
Sorosporium yoshinagae Zundel, Mycologia 31: 589. 1939.

On *Panicum repens* L., Trino-mura, Tosa, Japan, Aug. 8, 1922, T. Yoshinaga, type of *S. yoshinagae* (BPI); Botanical Garden, Buitenzorg, Java, April 1931, type of *U. amadelpha* var. *glabriuscula* (BPI).

As pointed out in a previous publication (5), all the specimens examined on *Panicum repens* formerly known as *Ustilago digitariae* agree with *S. formosanum* and should be assigned to that species.

Recently an authentic specimen of the former (Rab., Klotzsch. Herb. viv. myc. 119, sub *Uredo digitariae* Rab.) was examined. It has spores entirely smooth, clear yellow brown and 6—8 μ in diameter. The spore mass is semi-agglutinate but does not form balls. This specimen is the type of *Uredo digitariae* Rab. or *Ustilago pallida* Koern., but not of *Uredo digitariae* Kunze; although those names are ordinarily considered synonymous.

Sorosporium papuae (Zundel) Ling, comb. nov.

Syn.: *Sphacelotheca papuae* Zundel, Mycologia 31: 588. 1939.

Sori in the ovaries. Spore-balls oblong, opaque, 52—110 ⇌ 37—70 μ. Spores globose to oval, 8.5—11.5 μ; epispores thin, reddish brown, finely but distinctly echinulate.

On *Saccharum arundinaceum* Retz., on Fly River, 30 miles below Everill Junction, Papua, British New Guinea, May 1936, L. J. Brass 6582, type (BPI).

Thecaphora aterrima Tul., Ann. Sci. Nat. Bot. III. 7: 110. 1847.

On *Carex* sp., Gundla, Lahul, Punjab, India, Oct. 24, 1936, Walter Koetz 10294 (BPI).

Tolyposporella linearis (Berk. & Br.) Ling, comb. nov.

Gymnosporium lineare Berk. & Br., Jour. Linn. Soc. Bot. 14: 90. 1875.

Coniosporium lineare Sacc., Syll. Fung. 4: 243. 1886.

Ustilago linearis Petch, Ann. Roy. Bot. Gard. Peradeniya 9: 167. 1924.

Sori on both sides of the leaves, forming short linear striae 2—7 mm. long, first covered by host tissue which ruptures later disclosing a black agglutinate spore mass. Spore-balls varying in shape and size, composed of many firmly agglutinated spores. Spores irregular in shape, smooth, thick-walled; outer spores deep smoky brown, polyhedral, usually 9—16 ⇌ 7.5—13.5 μ, the elongate ones up to 21 μ long, epispores up to 4 μ thick, with the thickening more pronounced at the angles; inner spores usually lighter in color, subglobose to polyhedral, chiefly 7—12 μ long.

On *Vetiveria zizanioides* (L.) Nash. (= *Andropogon muricatus* Retz.), Ceylon, March 1868, Thwaites 506, type.

Tolyposporella pachycarpa (Syd.) Ling, comb. nov.

Syn.: *Sorosporium pachycarpum* Syd. apud Syd. & Petr., Ann. Myc. 26: 431. 1928.

On *Manisuris rottboellioides* (R. Br.) Kuntze (= *Rottboellia ophiuroides* Benth.), Stotsenberg, Pampanga Prov., Luzon, P. I., Nov. 1923,

M. S. Clemens, type (BPI); Kajabit Mission, Morobe, New Guinea, Sept. 14, 1939, M. S. Clemens 10693 (BPI); also Sept. 18, 1939, Clemens (BPI), and Nov. 19, 1939, Clemens 10822G (BPI).

The agglutinate sori and their occurence in the leaves provide the ground for transferring this species from *Sorosporium* to *Tolyposporella*.

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