

Taxonomic Notes on Asiatic Smuts — II.

By Lee Ling (Washington).

With 1 Textfig.

The present notes, as a continuation of a previous series, record the results of examining asiatic collections of the Ustilaginales in various herbaria in Europe and in North America. The writer is indebted to Mr. J. A. Stevenson for a review of the manuscript; to Miss Edith K. Cash for the preparation of the Latin diagnoses; and to all those for the privilege of studying material under their care¹⁾.

Ustilago bursa Berk., in Hooker's Journ. Bot. **6**: 204. 1854.

Tolyposporium bursum McAlp., Smuts Austral. 186. 1910.

Sphaelotheca bursa Mundk. & Thirum., Myc. Papers Imp. Myc. Inst. **16**: 6. 1946.

Sori in the ovaries, ellipsoidal, tapering at the apices, 5—10 mm. long, 3—5 mm. wide, each enclosed by a thick, rather persistent, grayish brown membrane of host tissue; columella absent. Spores globose to oval, 8.7—11 μ , mostly 9.5—10 μ diam.; epispires deep brown, distinctly echinulate, echinulations approximately 1 μ long.

On *Themeda arundinacea* (L.) Retz., Sikkim, India, type (K).

The collection (I. H. Burkhill 1415) reported by Sydow and Butler (7), and by Mundkur and Thirumalachari (4) as *U. bursa* is not this species and also differs somewhat from other species recorded on *Themeda*.

Ustilago idonea Syd., Ann. Myc. **37**: 442. 1939.

Ustilago sydowiana Mundk., Trans. Brit. Myc. Soc. **24**: 333. 1940.

On *Dactyloctenium scindicum* Boiss. (= *Eleusine aristata* Ehrenb.), Rohtak, India, Oct. 1938, S. Ahmad 166 (BPI).

Ustilago ocrearum Berk., in Hooker's Journ. Bot. **6**: 207. 1854 (Fig. 1).

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; CMI = Commonwealth Mycological Institute, Kew; FH = Farlow Herbarium, Harvard University; K = Royal Botanic Gardens, Kew; KR = Uniwersytet Jagiellonski, Krakow; S = Naturhistoriska Riksmuseet, Stockholm. Wherever the location is not given, the specimen is in the writer's personal collection.

Ustilago caulincola Zundel, Mycologia **34**: 123. 1942.

Sphacelotheca smithii Petr., Meddel, Fran Göteb. Bot. Trädg.

17: 115. 1947.

On *Polygonum campanulatum* Hook. f., Nangki, East Nepal,
10,000 ft, without collector and date, type (K).



Fig. 1. *Ustilago ocrearum* Berk., type. Infected plants of *Polygonum campanulatum* ($\times \frac{3}{4}$) and teleutospores ($\times 550$).

This fungus infects the young shoots or the young axillary branches rather than the ocreae. Its spores are extremely variable in shape and size. Cifferi's redescription (1) of this species is misleading in several aspects, but Petra k's description of *S. smithii* gives accurately the essential characters.

***Ustilago panjabensis* (Syd.) comb. nov.**

Sphaelotheca panjabensis Syd., Ann. Myc. **37**: 443. 1939.

Ustilago tragana Zundel, Mycologia **35**: 166. 1943.

Ustilago tragi Mundk., Indian Jour. Agr. Sci. **14**: 50. 1944.

On *Tragus biflorus* (Roxb.) Schult., Coimbatore, Madras, India, Nov. 24, 1917, P. V. S o m a y a j u l u , type of *U. tragi* (FH); On *Tragus racemosus* (L.) All., Hollandsdrift, Pietersburg, Transvaal, South Africa, April 26, 1937, A. M. Bottomley (BPI).

In this species, the sorus is covered at first by a thick, smooth membrane of host tissue, but inside this membrane also exists a layer of prosenchymatous tissue of fungus origin. Columella is not present. Such structure is not infrequently found in fungi ordinarily classified as *Ustilago*. The spores of this species measure chiefly 8.5—11.5 μ in diameter.

***Ustilago phragmitis* sp. nov.**

Soris in ovarii, partem majorem spicularum paniculae infectantibus, ovoideis vel elongato-ellipsoideis, utrinque attenuatis, compactis, plerumque 1—1.5 mm. longis, raro usque 2 mm. attingentibus, soro quoque membrana crassiuscula nigrescenti indehiscenti ex textura hospitis composita obvoluto; sporis agglutinatis, subglobosis vel ovalibus, saepe subangularibus, 9—12 \cong 7.5—10 μ , globula centrali irregulari praeditis; episporio flavidulo-olivaceo, circa 0.5 μ crasso, glabro, saepe leviter punctato; sporae hyalinae immaturaee saepe adsunt.

Sori in the ovaries, infecting most of the spikelets in a panicle, oval to elongate-ellipsoidal, tapering at both ends, compact, chiefly 1—1.5 mm. long, the most elongate ones rarely reaching 2 mm. in length, each enclosed in a rather thick, indehiscent membrane of host tissue which becomes black in dried specimen. Spores agglutinate, subglobose to oval, frequently subangular, 9—12 \cong 7.5—10.5 μ , each with a central irregular globule; epispires light yellow olivaceous, approximatley 0.5 μ thick, smooth, often appearing as faintly punctate under oil-immersion lens; hyaline, immature spores often present.

On *Phragmites karka* (Retz.) Trin., Elopera near Sandakan, North Borneo, Nov. 15, 1947, without collector, type (K).

Ustilago rabenhorstiana Kuehn, Hedwigia **15**: 4. 1876.

Ustilago royleani Syd. & Butl., Ann. Myc. **4**: 426. 1906.

On *Digitaria royleana* (Nees) Prain, Dehra, Dun, United Provinces, India, Oct. 10, 1903, E. J. Butler, type of *U. royleani* (S.).

The host of *U. royleani* was originally cited as *Paspalum royleanum* which probably misled the authors into the creation of a new name.

***Ustilago tumeformis* sp. nov.**

Soris in foliorum nervis mediis, tumorem globoideum 3—7 mm diam. formantibus, epidermide tectis, ea fissa massas atro-purpureas sporarum detegentibus; sporis globosis vel late ellipsoideis, 10.5—14 \cong 9.5—13.5 μ , pallide vinaceis, distincte reticulato-alatis, maculis distincte alatis, 2—4 μ diam., 1.5—2 μ altis.

Sori in the midribs of leaves, causing the formation of aggregated globoid tumors, 3—7 mm. in diameter, protected at first by the epidermis which ruptures irregularly disclosing dark purple brown spore masses. Spores globose to broadly ellipsoidal, 10.5—14 \cong 9.5—13.5 μ , light vinaceous, with distinct winged reticulations, 2—4 μ wide and 1.5—2 μ deep.

On *Polygonum chinense* L., Darjeeling, India, July 19, 1909, W. McRae, type.

This collection was reported by Sydow and Buttler (7) as *Ustilago tuberculiformis* Syd. which is characterized by the formation of slightly raised spot-like sori and by the spores ornamented with much finer reticulations.

***Sphacelotheca eremochloae* sp. nov.**

Soris in ovariis, glumis intactis, 1—1.5 mm longis vel inflorescentias omnino destruentibus, 4—6 mm longis; sporarum massis atris, pulverulentis, columellam centralem circumdantibus; cellulis sterilibus de membrana falsa disintegratis per massas sporarum sparsis, plerumque subglobosis, hyalinis, tenuiter tunicatis, 7.5—12 μ diam.; sporis globosis vel ellipsoideis, saepe paulo irregularibus, 6.7—10 \cong 5—5.8 μ ; episporio 0.7 μ crasso, rubro-brunneo, subtiliter punctato vel sublevi.

Sori in the ovaries, with glumes intact, 1—1.5 mm. in length, or destroying the whole inflorescences, 4—6 mm. in length. Spore mass black, pulverulent, surrounding a central columella. Sterile cells decomposed from the false membrane scattered throughout the spore masses, mostly subglobose, hyaline, thin-walled, 7.5—12 μ diameter. Spores globose to ellipsoidal, often somewhat irregular, 6.7—10 \cong 5.5—8 μ ; episporio 0.7 μ thick, reddish brown, finely punctate but appearing smooth under lower magnifications.

On *Eremochloa ciliaris* (L.) Merr., Vien Giang, Thanh Hoa, Tonkin, Indo-China, Feb. 9, 1893, R. P. Bon 9900, type (FH).

This collection was identified by Patouillard as *Ustilago carbo* DC. var., but apparently never recorded in his publications.

***Sphacelotheca heteropogonis-triticei* sp. nov.**

Soris inflorescentias omnino destruentibus, cylindricis, 2 cm. longis, 3 mm. diam., soro quoque membrana falsa tenui pallide brunneola e cellulis sterilibus hyalinis subglobosis usque oblongis 5—13 μ

longis composita primum tecto, hac membrana fissa massam sporarum atram agglutinatam columellam centralem circumdantem delegenti; sporis globosis usque ovoideis, saepe subangularibus, 7.5—10.5 = 6.7—9 μ ; episporio 0.5 μ crasso, ochraceo-brunneo, dense punctato.

Sori destroying the whole inflorescences, cylindrical, 2 cm. long, 3 mm. diameter, each enclosed at first by a thin, pale brownish false membrane which is composed of hyaline, subglobose to oblong sterile cells, 5—13 μ in length; upon the rupture of false membrane disclosing a black, agglutinate spore mass surrounding a central columella. Spores globose to oval, often slightly angular, 7.5—10.5 = 6.7—9 μ ; epispires 0.5 μ thick, ochraceous brown, densely punctate.

On *Heteropogon triticeus* (R. Br.) Stapf, south of Alaminos, Pangasinan prov., Luzon, Philippine Islands, March 1928, M. S. Clements, type (BPI).

This species is similar to *Sphaelotheca nealii* (Ell. & And.) Clint. in certain aspects. The latter, although described by Clinton (2) as infecting ovaries or spikelets and possessing usually smooth spores, often destroys the whole inflorescence of the host and has finely echinulate spores. When its infection involves the whole inflorescence, however, the sorus frequently appears twisted and somewhat lacerated, and is covered by a tough and rather thick false membrane. In the present species, however, the infected raceme, though much reduced in size and with all the floral organs destroyed, retains the general appearance of a normal inflorescence.

Sphaelotheca hydropiperis (Schum.) de B., Verg. Morph. Biol. Pilze 187. 1884.

Ustilago koordersiana Bref., Unters. Gesammtg. Myk. 12: 132. 1895.

Ustilago polygoni-barbati Bref., Unters. Gesammtg. Myk. 12: 229. 1895.

On *Polygonum barbatum*, L., Java, S. H. Koorders, type of *U. koordersiana* (BPI).

U. koordersiana was also reported by Yates (9) from Kwangtung, China and by Graff (3) from Negros, Philippine Islands. Both collections are *Ustilago cordai* Liro.

Sphaelotheca manilensis (Syd.) comb. nov.

Ustilago manilensis Syd., Ann. Myc. 12: 77. 1912.

Sori in the ovaries, destroying all the spikelets in a panicle, hidden by the glumes, ellipsoidal or ovoid, 2—3 mm. in length, each at first enclosed by a thin, brownish false membrane which disintegrates early disclosing a central, simple, slender, but distinct columella surrounded by a dusty, black spore mass. Sterile cells of

the false membrane subhyaline, thin-walled, subglobose to broadly ellipsoid, or somewhat irregular, 7.5—14.5 μ in length. Spores globose to oval, rather regular in shape, 10—13 \times 9—12 μ ; epispires medium reddish brown, about 1 μ thick, echinulate.

On *Sacciolepis indica* (L.) Chase, Manila, Luzon, Philippine Islands, Nov.—Dec. 1910, E. D. Merrill 7419, type (FH).

Sphacelotheca monilifera (Ell. & Ev.) Clint., Jour. Myc. **8**: 141. 1902.

On *Heteropogon contortus* (L.) Beauv., Taliparamba, North Malabar, Madras Presidency, India, Nov. 11, 1913, W. McCrae, Syd. Ust. 483 (BPI); Poona, Bombay, India, without collector and date (FH).

These two collections were reported respectively by Sydow (6), and Uppal et al. (8) as *Ustilago warneckiana* P. Henn. Although efforts to locate the type of that species were unsuccessful, Hennings' description that the sori reach 1 cm. long and the spores are "reticulato-verrucoso", clearly indicates its difference from *S. monilifera*. Zundel's description (10) of *Sphacelotheca werneckiana* is apparently based upon the exsiccati specimen incorrectly determined and issued by Sydow. The combination of *S. warneckiana* (P. Henn.) Zundel should be rejected, since Hennings himself suggested such a name along with the description of *U. warneckiana*.

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

On *Fimbristylis* sp., Fu Phap, Tonkin, Indo-China, Oct. 1889, B. Balansa 33 (FH).

This collection was reported by Patouillard (5) as *Cintractia junci* (Schw.) Trel.

Farysia merrillii (P.-Henn.) Syd. Ann. Myc. **17**: 41. 1919.

Farysia javanica Racib., Bull. Intern. Acad. Sci. Cracovie 1909: 354. 1909.

Farysia backeri Cif., Nuovo Giorn. Bot. Ital. **40**: 256. 1933.

On *Carex rafflesiana* Boott, Java, M. Raciborski, type of *F. javanica* (KR); Nirmela, Java, 1913, Backer 11058, type of *F. backeri* (BPI); on *Carex hysophila* Miq., Mt. Kinabalu, North Borneo, Oct. 21, 1931, J. & M. S. Clemens (FH).

Ciferri (1) described two species of *Farysia* from Java, i. e. *F. backeri* and *F. depsta*. An examination of the type collections reveals that the spore measurements given by him for these two species are mixed. In contrary to his descriptions, the former has spores rather uniform in shape measuring 7.5—11 μ in diameter, while the latter possesses spores very variable in shape and size, ranging 6.7—13.5 μ in diameter.

Sorosporium andropogonis-aciculati (Petch)
Petch, Ann. Roy. Bot. Gard. Peradeniya **5**: 227. 1912.

On *Rhaphis aciculata* (Retz.) Desv., Botanic Gardens, Singapore, Malay States, Jan. 21, 1948, R. E. Holttum; Palau Penang, Malay, States, April, 1913, sub *Ustilago balansae* Speg. (K).

Sorosporium flagellatum Syd. & Butl., Ann. Myc. **5**:
489. 1907.

Sorosporium geminellum Syd. & Butl., Ann. Myc. **10**: 253. 1912.

On *Ischaemum* sp., Maoryngkneng, Khasia Hills, Assam, India, June 12, 1911, I. H. Burkhill & S. C. Bansjee, type of *S. geminellum* (S); on *I. timorense* Kunth, Botanic Gardens, Singapore, Malay States, Jan. 1948, R. E. Holttum.

The host of *S. geminellum* was originally cited as *Andropogon*.

Sorosporium ischaemi sp. nov.

Soris in ovariis evolutis, oblongis, utrinque attenuatis, 4—6 mm. longis, 2—2.5 mm. latis, inter glumas divaricatas conspicue protrudentibus, soro quoque primum membrana crassa, persistenti, rubro-brunnea textura fungosa composita tecto, ea demum ex apice fissa massam granularem atram sporarum detegenti, columellam centralē prominentem saepe apice ramosam circumdanti; cellulis membranae hyalinis, globosis usque ellipsoideis, 10.5—21 \geq 9—16 μ ; glomerulis sporarum subevanescentibus, plerumque oblongis, 70—157 \geq 45—94 μ ; sporis globosis vel ovoideis, saepe ellipsoideis vel subangularibus, 9.7—13 \geq 8.5—11.5 μ ; episporio subtiliter echinulato, 1.5 μ crasso aequaliter ochraceo-brunneo.

Sori in the ovaries, oblong, tapering at both ends, 4—6 mm. long, 2—2.5 mm. wide, conspicuously protruding between the spreading glumes, each enclosed at first in a thick, rather persistent, deep red brown membrane of fungus tissue which ruptures later from the apex disclosing a granular, black spore mass surrounding a central, prominent columella, often branching at the tip; cells of the membrane hyaline, globose to ellipsoid, 10.5—21 \geq 9—16 μ . Spore-balls rather evanescent, mostly oblong, 70—157 \geq 45—93 μ . Spores globose to oval, often ellipsoid or slightly angular 9.7—13 \geq 8.5—11.5 μ ; epispores finely echinulate, 1.5 μ thick, medium ochraceous brown, uniformly colored.

On *Ischaemum rugosum* Salisb., Kumta, Poona, Bombay, India, without date and collector, type (FH).

This fungus was reported by Uppal et al. (8) as *Sorosporium flagellum* Syd. which destroys the whole inflorescences and has much larger spores.

Thecaphora mauritiana (Syd.) comb. nov.

Tolyposporium mauritianum Syd., Ann. Myc. **37**: 201. 1939.

Thecaphora fimbri stylidis Mundk. & Thirum., Myc. Papers Imp.
Myc. Inst. 16: 4. 1946.

On *Fimbristylis monostachya* (L.) Hassk., Mauritius, 1929, E. F. S. Shepherd, type (CMI); Bangalore, Mysore, India, Sept. 21, 1943, B. B. Mundkur; also Sept. 2, 1945, M. J. Thirumalachar.

This species is closely related to *Thecaphora aterrima* Tul.

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