

A PRELIMINARY SURVEY OF UREDINALES ON FORMOSAN GRAMINEAE⁽¹⁾

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Abstract: Forty three species and two varieties of rusts were collected from Formosan Gramineae. The rusts flora contain 14 species of new record from Taiwan and six new form-species of world record. In addition 52 taxa of Gramineae distributed among 27 genera are recorded first time as the new hosts of Formosan rusts.

INTRODUCTION

Prior to 1977, seventy four species of the graminicolous rusts have been reported separately by many workers, viz., Sawada (1919-1959), Fujikuro (1914), Hiratsuka, N. (1943), Hiratsuka, T. (1958), Hiratsuka and Hashioka (1933, 1934, 1935, and 1937), Hsieh *et al* (1977), Ito (1950), and Yen (1974-1975), from Taiwan. All of these taxa were reduced to 51 by Cummins (1971). As compare to 419 species listed in Cummins world monograph, the rust flora on Formosan Gramineae is still incomprehensive. An intensive taxonomic study was then initiated under the Cooperative Science Research Program between Republic of China and U. S. A. since 1977. The present paper enumerates the rust fungi collected by the authours during 1977-1978 field survey in Taiwan. In total 43 species and two varieties of rusts distributed among six genera are recorded including six new form-species and 14 species of rusts newly added to the Formosan fungal flora. In addition, 55 taxa of gramineae distributed among 27 genera are recorded first time as the new hosts of Formosan rusts. All specimens listed in this paper are deposited in the Herbarium of Department of Botany, National Taiwan University, Taipei, Taiwan. The synonyms listed in each rust species are limited to those published from Taiwan for the convenience of the native readers. The aster sign(*) refers to the new host plants newly recorded from Taiwan.

ENUMERATION OF SPECIES

1. *Dasturella divina* (Syd.) Mundk. & Khes., Mycologia 35: 203, 1943.

Uredo inflexa Ito, D. C. F. F.: VII, 65; IX, 141; XI, 82.

Anglospora divina Syd., D. C. F. F.: XI, 83

Kuehneola bambusae Fujik. ex Sawada, D. C. F. F.: IV, 71.

Puccinia inflexa Hori ex Fujik., D. C. F. F.: IV, 57.

Specimens examined. On *Bambusa beecheyana** Munro, NANTOU: Chitou, September 26,

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1978, *Z. C. Chen* 6180 (II). On *Bambusa multiflora**, NANTOU: Chitou, Sept. 26, 1978, *Z. C. Chen* 6187 (II). On *Bambusa multiplex** (Lour.) Rausch, NANTOU: Chitou, Sept. 26, 1978, *Z. C. Chen* 6178 (II). On *Bambusa multiplex* var. *elegans** (Koidz) Muroi, PINGTUNG: Shan-Ping, Sept. 19, 1978, *Z. C. Chen* 6153 (II). On *Bambusa oldhami* Munro, TAITUNG: Chi-Peng, Feb. 3, 1978, *Z. C. Chen* 5680 (II, III); PINGTUNG: Shan-Ping, Sept. 19, 1978, *Z. C. Chen* 6147 (II). On *Bambusa ventricosa** McClure, NANTOU: Chitou, Sept. 26, 1978, *Z. C. Chen* 6181 (II). On *Bambusa dolichoclada** Hayata, PINGTUNG: Shan-Ping, Sept. 19, 1978, *Z. C. Chen* 6150 (II). On *Ischurochloa stenostachya* (Hack) Nakai, TAITUNG: Chi-Peng, Feb. 3, 1978, *Z. C. Chen* 5681 (II); PINGTUNG: Shan-Ping, Sept. 21, 1968, *Z. C. Chen* 6165 (II). On *Ischurochloa stenostachya* cv. "Wei-feng Lin", NANTOU: Chitou, Sept. 26, 1978, *Z. C. Chen* 6184 (II). On *Dendrocalanus latiflorus* Munro, PINGTUNG: Nan-Jin-Shan, Sept. 14, 1978, *Z. C. Chen* 6127 (II).

Dasturella divina was reported previously from Taiwan by Sawada (D. C. F. F. XI: 82-83) and Yen (1975). Some hosts, viz., *Dendrocalanus latiflorus*, show the structure similar to the telia of genus *Kweilingia*. But Cummins (1971) did not recognize it as a rust fungus, therefore, at this moment we follow the treatment of Cummins.

2. *Phakopsora incompleta* (Syd.) Cumm., *Mycologia* 42: 786, 1950.

Puccinia incompleta Syd., D. C. F. F. IV: 57; IX: 54.

Specimens examined. On *Ischaenum aristatum* L., ILAN: Su-Ao, Sept. 25, 1960, *TAI* 137131 (II). On *Ischaenum indicum** (Houtt.) Merr., TAIPEI: Pai-Sha-Wan to Chin Shan, Oct. 9, 1977, *TAI* 170060 (II). On *Microstegium glaberrimum** (Honda) Honda, TAOYUAN: Shy-Men-Sui-Ku, Nov. 1, 1975, *TAI* 171842 (II). On *Microstegium nudum** (Trin.) A. Camus, NANTOU: Ren-Hua-Tzu, Oct., 1932, *TAI* 137763 (II). On *Microstegium vimineum** (Trin.) A. Camus, TAIPEI: Wu-Lai, May 3, 1959, *TAI* 169143 (II); TAIPEI: Ta-Tung-Shan, Oct. 19, 1977, *TAI* 170223 (II).

3. *Physopella clemensiae* (Arth. & Cumm.) Cumm. & Ramachar, *Mycologia* 50: 742, 1958. *NEW TO TAIWAN*

Specimens examined. On *Cyrtococcum accrescens** (Trin.) Stapf., PINGTUNG: Ma-Chya-Tsun, April 15, 1978, *Z. C. Chen* 2284 (II & III). On *Cyrtococcum patens* (L.) A. Camus, PINGTUNG: Kuan-Taou-Shi, March 26, 1971, *TAI* 140182 (II). On *Microstegium* sp., NANTOU: Ren-Hua-Tzu, Sept. 27, 1978, *Z. C. Chen* 6193 (II).

There is no previous report of this rust from Taiwan.

4. *Physopella compressa* (Mains) Cumm. & Ramachar, *Mycologia* 50: 742, 1958. *NEW TO TAIWAN*

Specimens examined. On *Paspalum orbiculare** Forst., PINGTUNG: Nan-Jin Shan, April 21, 1978, *Z. C. Chen* 3453 (II).

Both the rust species and the host plant are recognized as a new record of rust flora and a new host species of rust from Taiwan respectively.

5. *Uromyces coronatus* Miyabe & Nishida ex Dietel, *Bot. Centralbl.* 105: 495, 1907; Sawada, D. C. F. F. II: 91.

Uromyces zizaniae-latifoliae Sawada, D. C. F. F. II: 93.

Specimens examined. On *Zizania latifolia* (Griseb.) Stapf., TAOYUAN: Tao-Yuan, Oct. 24, 1934, *TAI* 171183 (II, III); PINGTUNG: Nan-Jin Shan, April 21, 1978, *Z. C. Chen* 5639 (II); Sept. 14, 1978, *Z. C. Chen* 6126 (II).

6. *Uromyces dactyloctenii* Wakef. & Hansf., Proc. Linn. Soc. Lond. **161**: 170, 1949. *NEW TO TAIWAN*

Specimens examined. On *Dactyloctenium* aegyptium** (L.) P. Beauv., PINGTUNG: Kung-Ting, Sept. 12, 1978, *Z. C. Chen 6097* (II, III).

This rust species is recorded as new to Taiwan, and it may be the northern limit of distribution in Asia.

7. *Uromyces linearis* Berk. & Br., J. Linn. Soc. Lond. **14**: 92, 1875; Sawada, D. C. F. F. **IV**: 40, **IX**: 87, **XI**: 30; Yen (1975).

Specimens examined. On *Panicum repens* L., TAIPEI: Taipei, City, June 16, 1959, *TAI 138531* (II); HUALIEN: Hua-Ren, Dec. 29, 1960, *TAI 170945* (II); PINGTUNG: Nan-Jin Shan, April 21, 1978, *Z. C. Chen 3550* (II, III), *3763* (II, III), *3954* (II, III); Su-Jong-Shi, April 23, 1978, *Z. C. Chen 3942* (II); Mu-Tan-Tzu, April 24, 1978, *Z. C. Chen 3610* (II).

8. *Uromyces setariae-italicae* Yoshino, Bot. Mag. Tokyo **20**: 247, 1906; Sawada, D. C. F. F. **I**: 361.

Uromyces leptodermus H. Syd. & P. Syd., D. C. F. F. **VII**: 46.

Specimens examined. On *Eriochloa* procer** (Retz.) Hubb., PINGTUNG: Heng-Tsung, Jan., 1960, *TAI 136389* (II, III); Shau-Kan, May, 1970, *TAI 136410* (II, III), CHIAYI: Shin-Kan, Dec. 12, 1960, *TAI 140008* (II, III). On *Setaria geniculata** (Lam.) Beauv., TAIPEI: Kuan-ying Shan, Oct. 16, 1960, *TAI 139368* (II), MIAOLI: Nei-Li, Oct. 21, 1960, *TAI 139365* (II); KAOHSIUNG: Chi-Shan, Oct. 17, 1969, *TAI 139389* (II); TAITUNG: Ran-Yu, Hong-To, Sept. 20, 1972, *TAI 169646* (II). On *Setaria pallide-fusca** (Schmmd.) Staff. TAITUNG: Rue-Kong-PO, Sept. 23, 1970, *TAI 155580* (II). On *Setaria viridis** (L.) Beauv., TAITUNG: Taitun City, July 23, 1959, *TAI 139508* (II, III). On *Eriochloa villosa** (Thumb.) Kunth., TAIPEI: Kuan-ying Shan, July 26, 1959, *TAI 136371* (II).

9. *Uromyces tenuiculis* McAlpine, Rusts of Australia, p. 87, 1906; Sawada, D. C. F. F. **IV**: 43, **IX**: 34.

Specimens examined. On *Sporobolus diander** (Retz.) Beauv., KAOHSIUNG: Navy Academy (Tzuo-ying), June 9, 1968, *TAI 139623* (II), PINGTUNG: Ma-Chya-Tsun, April 23, 1978, *Z. C. Chen 5625* (II). On *Sporobolus elongatus** R. Brown, TAIPEI: Shin-Tien, Nov. 26, 1933, *TAI 015359* (II, III); Yang-Ming-Shan, May 5, 1959, *TAI 133771* (II); Agincort, Aug. 15, 1933, *TAI 015375* (II). On *Sporobolus fertilis** (Steud.) W. D. Clayton, TAIPEI: Tsu-Huang-Ken, May 9, 1954, *TAI 139642* (II, III). On *Sporobolus indicus* (L.) R. Brown, TAIPEI: Shihlin, (Sizangan), May 14, 1933, *TAI 05332* (II); NANTOU: Chen-You-Lan-Chi, April 29, 1978, *Z. C. Chen 3032* (II); PINGTUNG: Mu-Tan-Tzu, April 24, 1978, *Z. C. Chen 3333* (II); Ma-Chya-Tsun, April 13, 1978, *Z. C. Chen 5625* (II); Ken-Ting, Sept. 12, 1978, *Z. C. Chen 6101* (II).

10. *Puccinia aestivalis* Diet., Bot. Jahrb. **34**: 585, 1905.

Specimens examined. NANTOU: Chitou, On *Microstegium ciliatum* A. Camus, April 29, 1978, *Z. C. Chen 4788* (II).

11. *Puccinia arthraxonis-ciliaris* Cumm., Uredineana **4**: 16, 1953.

Uredo arthraxonis-ciliaris P. Henn., D. C. F. F. **VII**: 64; **IX**: 133.

Specimens examined. On *Arthraxon hispidus* Makino, TAIPEI: Shan-Tzu-Chiaou, Oct. 21, 1960, *TAI 134620* (II); Shiau-Ko-Tou to Lu-Su-Tang, Oct. 30, 1969, *Z. C. Chen 560* (II); Taipei, Oct. 19, 1977, *TAI 170220* (II). On *Arthraxon hispidus* Makino var. *typicus* Honda, TAIPEI: Taipei, Oct. 1923, *TAI 15523* (II); TAITUNG: Ran-Yu, June 3, 1926, *TAI 15521* (II). On

*Arthraxon pauciflorus** Honda, TAITUNG: Ran-Yu, June 3, 1926, *TAI. 15527* (II). On *Arthraxon pauciflorus* var. *nuticus** Honda, CHIAYI: Yu-Shan (Mt. Morrison), Oct. 1928, *TAI. 15532* (II).

Notes. Sawada (1943) regarded the perfect stage of this fungus as *Puccinia arthroxonis* (P. Henn.) Syd. & Butl. (D. C. F. F. IX: 133).

12. *Puccinia cacao* McAlp., Rust of Australia, p. 117, 1906.

Specimens examined. On *Hemarthria compressa** (L. F.) R. Br., CHIAYI: Pun-Chi-Hu, Oct. 28, 1962, *TAI. 019342* (II). On *Pogonatherum crinitum** Kunth., TAITUNG: Ran-Yu, May, 19, *TAI. 16356* (II); PINGTUNG: Mu-Tan-Tzu, April 24, 1978, *Z. C. Chen 3402* (II). *Pogonatherum crinitum* Kunth. is a new host species of this rust species and has been previously reported as a host of *Puccinia pogonatheri* Petch. from Taiwan.

13. *Puccinia cenchri* Diet. & Holw. var. *cenchri* Cumm. The Rust Fungi of Cereals, Grasses, and Bamboos, p. 198, 1971. *NEW TO TAIWAN*

On *Cenchrus calyculatus** Cavan., YUNGLIN: Hu-Wei, June 15, 1958, *TAI. 019585* (II). On *Cenchrus echinatus** L., KAOHSIUNG: Kao-Hsiung, Aug. 1, 1958, *TAI. 135111* (II).

14. *Puccinia cesatii* Schroet, Cohn Beitr. Biol. Pflanzen 3: 70, 1879. *NEW TO TAIWAN*

Specimens examined. On *Bothriochloa ischaenum** (L.) Keng, CHIAYI: Chia-yi Agricultural Experimental Station, May 3, 1932, *TAI. 15272* (II).

This rust species is new to Taiwan, and probably a cosmopolitan rust.

15. *Puccinia coronata* Corda, var. *coronata* Cumm., The Rust Fungi of Cereals, Grasses, and Bamboos, p. 141, 1971.

Puccinia lolii Niels., D. C. F. F. IV: 63; IX: 57.

Specimens examined. On *Phalaris arundinacea** L., CHIAYI: A-Li-Shan, June 22, 1970, *TAI. 181111* (II).

16. *Puccinia coronata* Corda var. *himalensis* Barcl. Trans. Linn. Soc. Lond 3: 227, 1891. Sawada, D. C. F. F. XI: 90.

Puccinia himalensis (Barcl.) Diet., D. C. F. F. XI: 89.

Specimens examined. On *Polygonum fugax** Steud., ILAN: Tai-Ping Shan, April 24, 1930, *TAI. 133549* (II). On *Brachypodium formosanum* Hay., TAIPEI: Sankan. July 15, 1932, *TAI. 159957* (II); NANTOU: Nantou, Aug. 29, 1963, *TAI. 017812* (II).

Polygonum fugax Steud. is a new world record of host genus and species attacked by this rust variety.

17. *Puccinia cynodontis* Lacroix ex Desm., Pl. Crypt. Ser. III. No. 655, 1859. Sawada, D. C. F. F. IX: 44; XI: 89. Yen (1975).

Puccinia varians Diet., D. C. F. F. IV: 69.

Uredo elusine-indicae Sawada, D. C. F. F. I X: 141; 89.

Specimens examined. On *Cynodon dactylon* Pers., PINGTUNG: Shan-ti T'iang, 7th Compartment, April 16, 1978, *Z. C. Chen 2660* (II); Su-Chung-Chi, April 23, 1978, *Z. C. Chen 2416* (II, III).

18. *Puccinia duthiae* Ell. & Tracy, in Ellis and Everhart Bull. Torrey Bot. Club 24: 283, 1897. *NEW TO TAIWAN*

Specimens examined. On *Bothriochloa glabra** (Roxb.) A. Camus, TAINAN: An-Ping, June 29, 1960, *TAI. 134883* (II). On *Bothriochloa intermedia* (R. Br.) A. Camus; KAOHSIUNG:

Kao-Hsiung, Dec. 24, 1930, *TAI.* 331 (II, III); TAINAN: Shin-Hua, June 29, 1960, *TAI.* 134891 (II, III); PINGTUNG: Heng-Tsng, Oct. 9, 1960, *TAI.* 134882 (II). On *Bothriochloa (Andropogon) ischaenum* (L.) Keng, TAIPEI: Taipei, Aug. 10, 1945, *TAI.* 15270 (II); PINGTUNG: Suchung-chi, Oct. 10, 1950, *TAI.* 134832 (II). On *Bothriochloa ischaenum* var. *genuinus* Honda, TAINAN: Hsin-Hua, April 23, 1923, *TAI.* 15268 (II). On *B. ischaenum* var. *radicans* Hackel, KAOHSIUNG: Kao-Hsiung, Dec. 24, 1933, *TAI.* 384 (II, III).

19. *Puccinia erythropus* Diet., Bot. Jahrb. 37: 101, 1905.

Specimens examined. On *Miscanthus floridulus** (Labill.) Warb., NANTOU: Chi-Ti, April 28, 1978, *Z. C. Chen* 5070 (II, III). On *Miscanthus sinensis* Anders., PINGTUNG: Wu-Tai, April 14, 1978, *Z. C. Chen* 4810 (II, III).

20. *Puccinia flaccida* Berk. & Br., in Berkeley J. Linn. Soc. 14: 91, 1873.

Puccinia levigata (H. SYD. & P. SYD.) Hirat., D. C. F. F. VII: 49.

Specimens examined. On *Oplismenus compositus* (L.) Beauv., PINGTUNG: Mu-Tan-Shiang, April 24, 1978, *Z. C. Chen* 3839 (II, III).

21. *Puccinia invenusta* H. Syd. & P. Syd. in Sydow and Butler Ann. Mycol. 5: 498, 1907. NEW TO TAIWAN

Specimens examined. On *Phragmites communis** (L.) Trin., CHIAYI: Tong-Shu, Dec. 6, 1960, *TAI.* 139998 (II, III).

22. *Puccinia levis* Sacc. & Bizz. var. *tricholaenae* (H. SYD. & P. SYD.) Ramachar & Cumm. Mycopath. Mycol. Appl. 25: 44, 1965. NEW TO TAIWAN

Specimens examined. On *Rhynchelytrum* repens** (Willd.) C. E. Hubb., TAITUNG: Than-Wu, Feb. 4, 1978, *Z. C. Chen* 5594 (II); PINGTUNG: Wu-Tai, April 13, 1978, *Z. C. Chen* (II).

23. *Puccinia lophatheri* (H. Syd. & P. Syd.) Hirat. F. J. Jap. Bot. 14: 36, 1938.

Diorchidium lophatheri H. Syd. & P. Syd., D. C. F. F. I: 375; IX: 78.

Specimens examined. On *Lophatherum gracile* Brongn., TAIPEI: Taipei, April 23, 1938, *TAI.* 018854 (II); July 12, 1960, *TAI.* 133321 (II); PINGTUNG: Nan-Jin-Shan, April 21, 1978, *Z. C. Chen* 4758 (II).

24. *Puccinia microspora* Diet., Bot. Jahrb. 27: 101, 1905. NEW TO TAIWAN

Specimens examined. On *Imperata cylindrica* (L.) P. Beauv. var. *major** (Nees) C. E. Hubb., TAIPEI: Kuan-Yin-Shan, Oct. 16, 1960, *TAI.* 137314 (II). On *Imperata cylindrica** (L.) P. Beauv., PINGTUNG: Nan-Jin Shan, April 21, 1978, *Z. C. Chen* 3766 (II); Mu-Tan-Tiang, April 24, 1978, *Z. C. Chen* 3371 (II).

25. *Puccinia miscanthi* Miura, Fl. Manchuria and E. Mongolia Pt. 3: 302, 1928.

Puccinia eulaliae Barcl., D. C. F. F. I: 367; IX: 48.

Specimens examined. On *Miscanthus sinensis* Anders., NANTOU: Ho-She, April 30, 1978, *Z. C. Chen* 3935 (II).

26. *Puccinia nakanishikii* Diet., Bot. Jahrb. 34: 585, 1905. Sawada, D. C. F. F. VII: 47, 49.

Uredo tonkinensis P. Henn., D. C. F. F. X: 48.

Puccinia citrata H. Syd., D. F. F. XI: 90.

Puccinia cymbopogonicola Sawada, D. C. F. F. IX: 43.

Specimens examined. On *Cymbopogon goeringii** A. Camus, MIAOLI: Nei-Ma, April 29, 1933, *TAI.* 015569 (II).

27. *Puccinia oahuensis* Ell. & Ev. Bull. Torrey Bot. Club 22: 435, 1895. Sawada, D. C. F. F. IV: 63; IX: 62.
Specimens examined. On *Digitaria adscendens* Henard, PINGTUNG: Chi-Peng, Feb. 3, 1978, *Z. C. Chen* 2912 (II, III). On *Digitaria ciliaris* (Retz.) Koel., TAICHUNG: Getubi, Aug. 25, 1936, (II). On *Digitaria henryi** Rendle, TAIPEI: Yang-Ming-Shan, Oct. 2, 1960, *TAI. 135789* (II); Shu-Meng-Tsung, Oct. 5, 1970, *TAI. 140374* (II); TAITUNG: Ran-Yu, Jan. 30, 1978, *Z. C. Chen* 5699 (II); PINGTUNG: Ma-Chia-Tsung, April 15, 1978, *Z. C. Chen* 3312 (II, III); *Z. C. Chen* 3266 (II). On *Digitaria hetrantha** (Hook, F.) Merr., TAINAN: Nov. 3, 1934, *TAI. 019692* (II). On *Digitaria sericea** (Honda) Honda, YUNGLIN: Touliu, Feb. 4, 1966, *TAI. 020117* (II). On *Digitaria setigera** Roem. & Schult. TAITUNG: Chi-Peng, Oct. 8, 1960, *TAI. 135721* (II); Kuan-Tau-Chi, Sept. 7, 1972, *TAI. 147848* (II); NANTOU: Ho-She, April 30, 1978, *Z. C. Chen* 2593 (II). On *Digitaria violascens** Link, TAIPEI: Taipei, Oct. 17, 1930, *TAI. 135595* (II); PINGTUNG: Wu-Tai, April 14, 1978, *Z. C. Chen* 2862 (II).
28. *Puccinia paspalina* Cumm. Bull. Torrey Bot. Club, 72: 211, 1945.
Uredo paspalum-scrobiculati H. Syd. & P. Syd., D. C. F. F. IV: 83; X: 46.
Specimens examined. On *Paspalum longifolium** Roxb., TAICHUNG: Pah-sien, Aug. 5, 1959, *TAI. 138108* (II). On *Paspalum orbiculare** Forst., TAIPEI: Wu-Lai, May 3, 1959, *TAI. 138193* (II). On *Paspalum scrobiculatum* L., TAIPEI: Pai-Sha-Wei-Ku, April 3, 1930, *TAI. 021120* (II). On *Paspalum thunbergii** Kunth ex Steud., TAIPEI: Taipei city, July 12, 1960, *TAI. 169339* (II).
29. *Puccinia polliniae* Barcl., J. Asiatic Soc. Bengal 58: 243, 1889. NEW TO TAIWAN
Specimens examined. On *Microstegium dilatatum** Koidz., CHIAYI: Mt. Alishan, Nov. 11, 1977, *Z. C. Chen* 4790 (II).
30. *Puccinia purpurea* Cke., Grevillea 5: 15, 1876. Sawada, D. C. F. F. IV: 64; IX: 67; XI: 91.
Uredo sorghi Pass., D. C. F. F. XI: 91.
Uredo sorghi Fuckel, D. C. F. F. XI: 91.
Puccinia prunicolor H. Syd., D. C. F. F. XI: 91.
Puccinia sorghi-halepensis Speg., D. C. F. F. IV: 64.
Specimens examined. On *Sorghum bicolor** (L.) Moench, PENGHU: Fong-Kuei, July 8, 1972, *TAI. 146928* (II). On *Sorghum halepense* (L.) Pers., TAIPEI: NTU Agriculture Farm, summer, 1960, *TAI. 169076* (II); MIAOLI: Tahu, July 27, 1972, *TAI. 147377* (II).
31. *Puccinia pusilla* H. Syd. & P. Syd., in Sydow and Butler Ann. Mycol. 4: 435, 1906. Sawada, D. C. F. F. XI: 92.
Specimens examined. On *Capillipedium* parviflorum** (R. Br.) Stapf., PINGTUNG: Suchung-Chi, Dec. 14, 1977, *TAI. 17411* (II).
32. *Puccinia substriata* Ell. & Barth. var. *substriata** Cumm. The Rust Fungi of Cereals, Grasses, and Bamboos. p. 237, 1971. NEW TO TAIWAN
Specimens examined. On *Digitaria ciliaris* (Retz.) Koel., TAITUNG: Is. Lanyu, Jan. 3, 1929, *TAI. 019868* (II, III). On *Digitaria leptalea* Ohwi var. *reticulmis** Ohwi, TAIPEI: Sui-Yuen-Tzu, April 26, 1929, *TAI. 019712* (II, III).
33. *Puccinia substriata* Ell. & Barth. var. *penicillariae* (Speg.) Ramachar & Cumm., Mycopath. Mycol. Appl. 25: 26, 27, 1965. NEW TO TAIWAN
Specimens examined. On *Pennisetum* setosum** (Swartz) L. Rich., TAINAN: South East-West Highway, West Entrance Check Station, Dec. 26, 1977, *Z. C. Chen* 5496 (II); PINGTUNG: Wu-Tai, April 14, 1978, *Z. C. Chen* 3204 (II).

34. *Puccinia taiwaniana* Hirat. F. & Hashioka. Trans. Tottori Soc. Agr. Sci. 5: 240, 1935. Sawada, D. C. F. F. VII: 51.

Specimens examined. On *Cyrtococcum accrescens** (Trin.) Stapf., PINGTUNG: Nan-Jen Shan, April 21, 1978, *Z. C. Chen* 2371 (II); Pingtung, Oct. 30, 1935, *TAI* 019608 (II). On *Cyrtococcum patens* (L.) A. Camus, TAIPEI: Yan-Ming-Shan, Oct. 24, 1954, *TAI* 135466 (II, III). On *Cyrtococcum patens* (L.) A. Camus var. *warburgii* (Meg.) Reeder, TAIPEI: San-Chu-Chiao, Oct. 21, 1960, *TAI* 135447 (II).

35. *Puccinia versicolor* Diet., & Holw., in Holway, Bot. Gaz. 24: 28, 1897. Sawada, D. C. F. F. XI: 93.

Uredo themeda Diet., D. C. F. F. XI: 93.

Puccinia filipodia Cumm., D. C. F. F. XI: 93.

Puccinia themedae Hirat. f., D. C. F. F. XI: 93.

Specimens examined. On *Heteropogon contortus* (L.) Beauv. ex Roem. Schult., TAITUNG: Pinan, Oct. 17, 1934, *TAI* 015727 & 171150 (II); TAINAN: Tainan, Nov. 4, 1934, *TAI* 171972 (II).

36. *Puccinia zoysiae* Diet., Bot. Jahrb. 32: 48, 1902. Sawada, D. C. F. F. IV: 71; IX: 77.

Specimens examined. On *Zoysia sinica* Hance, TAIPEI: Chu-Wei, April 5, 1959, *TAI* 139910 (II).

37. *Uredo cyrtococci* Chen sp. nov.

Fig. 1 & Plate 1

Soris uredosporiferis hypophyllis, compactis, rotundatis, ellipticis vel oblongis, ad 0.5 mm longis, cinnamomeo-brunneis; urediniosporis brunneis, subglobosis, ovoideis, vel ellipsoideis, 20-25 × 17-20 μm, echinulatis; episporio 1.5-2.5 μm crasso; poris germinationis 4-5, aequatorialibus; paraphysibus clavatis vel capitatis, 43-75 μm longis, non-septatis, ad apicem 18-25 μm crassa, ad latere 5-7 μm crassa, hyalinis; membrana ad apicem 3-7.5 μm crassa, ad latere 1-1.5 μm crassa.

HAB. in folis vivis *Cyrtococcum patens* A. Camus, NANTOU: Chi-Tou, April 28, 1978, *Z. C. Chen* 2439 (HOLOTYPE).

The present species is closely related to *Puccinia taiwaniana* Hiratsuka f. & Hashioka from which it distinctly differs by its capitate paraphyses.

38. *Uredo digitariae-violascens* Chen sp. nov.

Fig. 2 & Plate 2

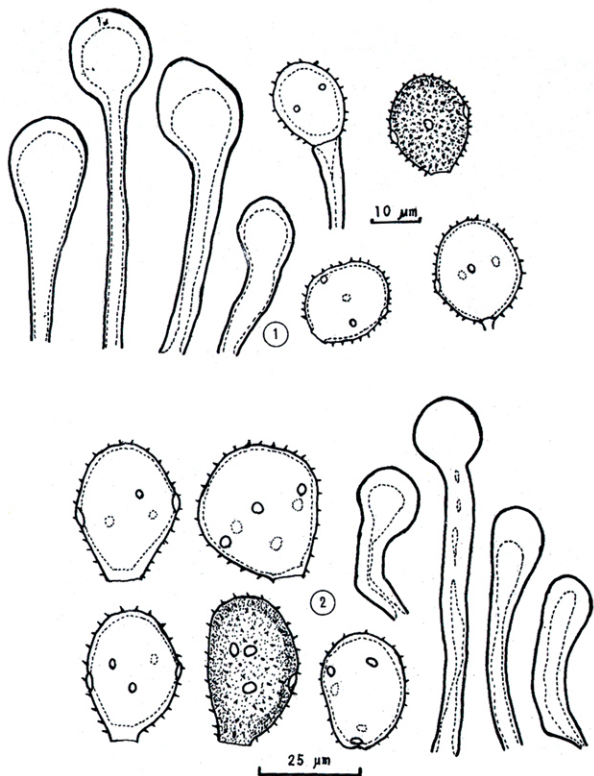
Soris uredosporiferis amphigenis, praecipue hypophyllis, minutis, atrobunneis, ovoideis vel fusiformis, 0.3-0.6 mm longis, sparsis, plerumque confluentibus linearescens, maculis violascens vel atro-brunneis, insidentibus; urediniosporis subglobosis, ellipsoideis vel obovatis, at basim plerumque truncatis, cinnamomeis vel castaneis; 20-25 × 25-35 μm; episporio echinulato, 2-3 μm crasso; poris germinationis 5-6, aequatorialibus; paraphysibus formis variabilibus, cylindraceis, clavatis, clavatis, capitatis, vel clavato-capitatis, hyalinis, aureis vel cinnamomeis, 60-90 μm longis, ad capitulis (10-) 15-20 (-23) μm latis, membrana ad apicem 4-10 μm crassa, ad latere 1.5-2.5 μm crassa.

HAB. in folis vivis *Digitaria violascens* Link, NANTOU: Chi-Tou, April 28, 1978, *Z. C. Chen* 2865 (HOLOTYPE).

The present species is closely related to *Puccinia oahuensis* Ell. & Ev. and *Puccinia digitariae-velutinae* V. from which it differs by its much thicker apex of paraphyses.

39. *Uredo ditissima* Cumm. in Hino & Katumoto, Bull. Fac. Agr. Yamaguti Univ. 11: 27, 1960. Yen (1975).

Specimens examined. On *Dendrocalamus latiflorus* (Munro) Mac. KAOHSIUNG: Nan-Feng



Figs. 1-2. Uredinospores and paraphyses.

1. *Uredo cyrtococci*.2. *Urdo digitariae-violascens*.

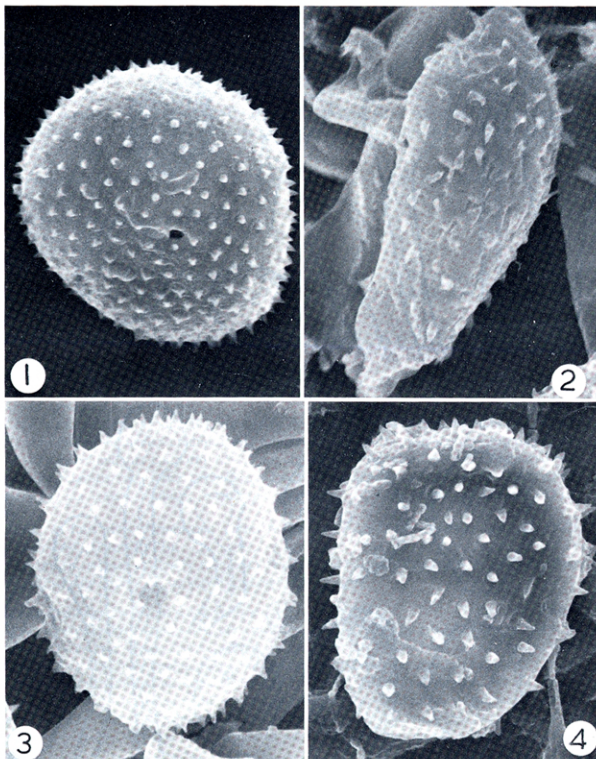


Plate 1-4. Scanning electron micrographs of urediniospores.

1. *Uredo cyrtococi*, $\times 4,000$;
2. *Uredo digitariae-violascens*, $\times 3,000$;
3. *Uredo festucae-parviglumae*, $\times 5,000$;
4. *Uredo oplismeni-undulatifolii*, $\times 3,000$.

Shan to Feng-Kuan, Shan, Sept. 20, 1978, *Z. C. Chen* 6160; NANTOU: Len-Hua-Tzu, Sept. 28, 1978, *Z. C. Chen* 6200.

40. *Uredo festucae-parviglunae* Chen *sp. nov.*

Fig. 3 & Plate 3

Soris uredosporiferis plerumque hypophyllis; urediniosporis ellipsoideis vel obovoideis, hyalinis vel flavideis, (17-) 21-27 × (15-) 17-22 μm, echinulatis; episporio 1-2 μm crasso; poris germinationis 3-5 dispersis; paraphysibus clavatis vel capitatis, 20-65 μm longis, 8.5-15 μm crassis per formam clavatae, 15-20 μm crassis per formam capitatae; pedicellis 3-5 μm crassis, membrana uniformiter tenui 1-2 μm crassa.

HAB. in folis vivis *Festuca** *parvigluna** Stend., TAOYUAN: La-La Shan, Sep. 27, 1930, *TAI* 018466 (HOLOTYPE).

The present species is closely related to *Puccinia pygmaea* Eriks. var. *minor* Cumm. & H. C. Greene and *Puccinia brachypodii* Othth var. *poae-nemoralis* (Othth) Cumm. & H. C. Greene from which it distinctly differs by having fewer germ pores.

41. *Uredo ignava* Arth. Bull. Torrey Bot. Club. 46: 121, 1919. *NEW TO TAIWAN*

Specimens examined. On *Bambusa oldhamii* Munro, NANTOU: Chi-Tou, Sept. 26, 1978, *Z. C. Chen* 6182. On *Bambusa vulgaris* Schrad. ex Wendl. KAOHSIUNG: Shaping, Sept. 19, 1978, *Z. C. Chen* 6184; NANTOU: Chi-Tou, Sept. 26, 1978, *Z. C. Chen* 6183. On *Bambusa vulgaris* Schrad. ex Wendl. var. *striata* (Lodd.) Gamble, KAOHSIUNG: Shaping, Sept. 19, 1978, *Z. C. Chen* 6152; NANTOU: Chi-Tou, Sept. 26, 1978, *Z. C. Chen* 6186.

42. *Uredo microstegii* Chen *sp. nov.*

Fig. 5 & Plate 5

Soris uredosporiferis plerumque hypophyllis, orbiculatis vel breviter ellipsoideis, 0.1-0.2 mm diam, diluto-brunneis; urediniosporis hyalinis, auro-, vel cinnamomeo-brunneis, ovoideis vel pyriformibus, 25-34 × 23-30 μm, echinulatis; episporio 1-1.5 μm crasso; poris germinationis 5 vel plus, dispersis; paraphysibus hyalinis, incurvis vel clavatis, 10-15 μm crassis, ad 60 μm longis; membrana tenui, 1.5-2 μm crassa.

HAB. in folis *Microstegium ciliatum* A. Camus, PINGTUNG: Tsao-Pu, Oct. 9, 1960, *TAI* 17669 (HOLOTYPE).

The present species is closely related to the uredinia stage of *Puccinia aestivalis* Diet. from which it differs by its scattered arrangement of germ pores.

43. *Uredo miscanthi-floriduli* Chen *sp. nov.*

Fig. 6 & Plate 6

Soris uredosporiferis amphigenis, plerumque in pagnis ligularum, maculis fusiformis, ad 1.5 cm longis, plerumque 0.5 cm longis, decoloratis dilutobrunneis interius, at marginem atrobunneis indentibus, oblongis vel fusiformis, ad 1 mm longis, confluentibus linearesibus, diluto-cinnamomeobrunneis, pulverulentis; urediniosporis flavo-brunneis, pyriformis vel ellipsoideis, (11-) 14-17 (-20) × 17-25 μm, sparsim echinulatis, spinis ad 1 μm longis, dispositis ad 2 μm distantis; episporio 1-2 μm crasso, ad apices incrassatis, 2.5-3 μm crasso; poris germinationis 8-11, dispersis; paraphysibus hyalinis vel aureis, clavatis vel capitatis, 7-10 × 18-28 per formam clavatae, capitulis 11-15 μm diam, pedicellis 28-45 μm longis per formam capitatae, membrana 1-1.5 μm crassa.

HAB. in folis *Miscanthus floridulus* (Labill.) Warb. CHIAYI: Mt. Arishan, Nov. 12, 1977, *Z. C. Chen* 5684 (HOLOTYPE); PINGTUNG: Ma-Chia-Tsun, April 13, 1978, *Z. C. Chen* 4955.

The present species is closely related to *Uredo miscanthi-sinensis* Sawada from which it differs by having the echinulate spores.

44. *Uredo oplismeni-undulatifolii* Chen *sp. nov.*

Fig. 4 & Plate 4

Soris uredosporiferis amphigenis, maculis fusiformis, ad 1 mm longis, decoloratis atro-

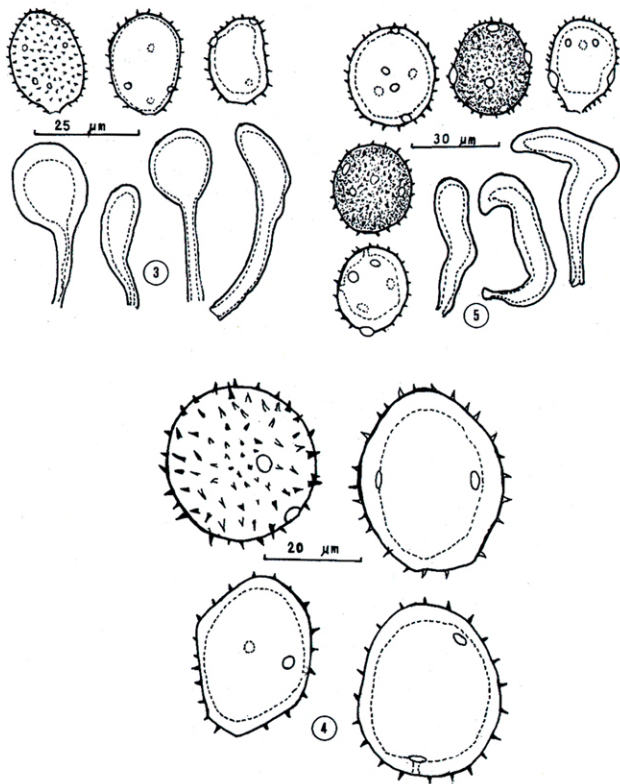


Fig. 3. Urediniospores and paraphyses of *Uredo festucae-parviglumae*.

Fig. 4. Urediniospores of *Uredo oplismeni-undulatifolii*.

Fig. 5. Urediniospores and paraphyses of *Uredo microstegii*.

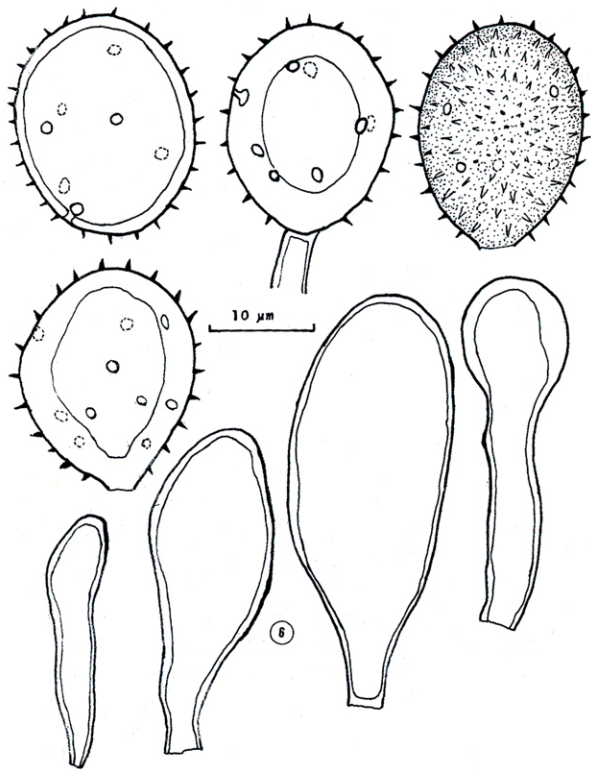


Fig. 6. Uredinospores and paraphyses of *Uredo miscanthi-floriduli*.

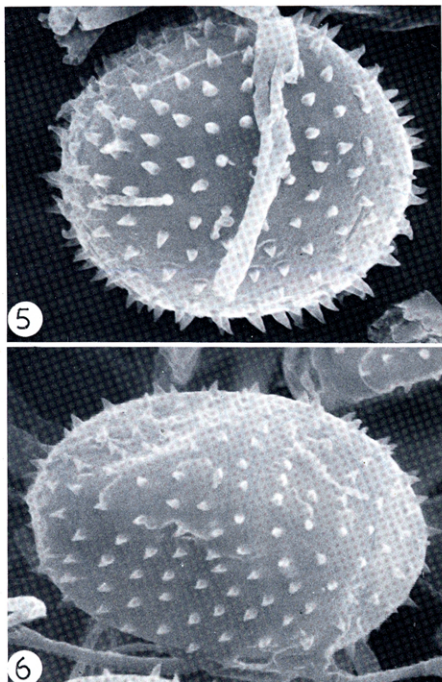


Plate 5-6. Scanning electron micrographs of uredinospores.

5. *Uredo microstegii*, $\times 4,000$.

6. *Uredo miscanthi-floriduli*, $\times 5,000$.

brunneis, insidentibus, oblongis vel rectangularibus, 0.2–0.5 mm longis, diluto-cinnamomeis, pulverulentis; urediniosporis subglobosis, pyriformis vel obovoideis, hyalinis, 27–35 × 26–37 μ m; episporio uniformiter, 2.5–3 μ m crasso, sparsim echinulatis, spinis asperis, 2 × 1.2 μ m, dispositis ad 4–5 μ m distantis; poris germinationis 2–3, aequatorialibus; paraphysibus nullis.

HAB. in folis *Oplismenus undulatifolius** (Ard.) Beauv., TAICHUNG: Nankangchi, Oct. 11, 1959, *T.A.I.* 137623 (HOLOTYPE).

The present species is closely related to *Puccinia inclita* Arth., *Puccinia flaccida* Berk. & Br., and *Puccinia opipara* Cumm. from which it distinctly differs with the first by thicker spore wall, with the second by the bigger spores and with the last one by the smaller spores respectively. According to Cummins (1971), all *Puccinia* which attack *Oplismenus* belong to Group V uredinia type. The present species also belongs to this Group and it is suspected that it may have a *Telia* stage of *Puccinia*.

45. *Uredo palmifoliae* Cumm., *Mycologia* 33: 151, 1941. *NEW TO TAIWAN*

Specimens examined. On *Setaria palmifolia** (Koen.) Stapf., TAIPEI: Taipei city, March 19, 1933, *T.A.I.* 021790; PINGTUNG: San-Ti-Hsiang, April 16, 1978, *Z. C. Chen* 5395.

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