



1, Effused mycelium on leaves of *Poa*, healthy leaf at bottom (scale in mm); 2, spot-like mycelium on *Triticum* (note immersed cleistothecia) $\times 10$ (DAOM 7738); 3, cleistothecium with irregular appendages (DAOM 38670); 4, ascus without spores, mag. as in 5 (DAOM 12113); 5, conidiophore with swollen basal cell, conidia in a chain, and a single mature conidium.

Erysiphe graminis DC. ex Mérat, Nouv. fl. env. Paris ed. 2, 1. 1821.

≡ *Erysiphe graminis* DC. Fl. Franc. 6: 106. 1815.

CLEISTOTHECIA amphigenous or on only one side of leaf, immersed in effused or spot-like persistent mycelium; globose, 130-250 μ diameter. APPENDAGES simple, irregular, variable in length, 10-20(-30) in number, hyaline to pale brown. ASCI 6-18, 60-95 \times 23-38 μ . ASCOSPORES not seen in Canadian specimens but are reported in European specimens (see notes). CONIDIA ellipsoid to barrel-shaped, hyaline, catenate, 20-33.6 \times 9.6-15.3 μ . CONIDIOPHORES arise from the surface mycelium and have a swollen basal cell, and a simple generative cell topped by the basipetally forming conidia.

HOSTS: Gramineae: *Agropyron*, *Avena*, *Beckmannia*, *Dactylis*, *Elymus*, *Hierochloe*, *Hordeum*, *Melica*, *Puccinellia*, *Poa*, *Secale*, *Triticum*. Additional Gramineae are recorded in other countries.

DISTRIBUTION: Throughout Canada, ranging well into the Arctic Islands with specimens as far north as Hazen Camp on Ellesmere I. (82° N).

COLLECTIONS (selected): *Agropyron repens* (L.) Beauv.: Ont., Carl. Co., Mouth of Jock River, 16 July 1942, DAOM 7842; Alta., Edmonton, 6 June 1932, 2219. *Avena barbata* Brot., (seed originating in Algeria), Ont., Carl. Co., Ottawa Research Station, 16 Sept. 1965, 147852. *Beckmannia syzigachne* (Steud.) Fern., Sask., Saskatoon, 26 July 1919, 140565. *Dactylis glomerata* L., B.C., North Saanich, 12 Apr. 1934, 118220. *Hierochloe odorata* (L.) Beauv., Sask., Vonda Lake, 16 Aug. 1936, 4071. *Hordeum jubatum* L., N.W.T., Hay River, 10 Sept. 1940, 7107. *Hordeum vulgare* L.: Que., La Pocatière, 8 Aug. 1940, 18154; B.C., Sidney, 20 July 1937, 118221. *Melica subulata* (Griseb.) Scribn., B.C., Vancouver I., Sidney, 15 July 1956, 55075. *Poa arctica* R. Br., Yukon Terr., Shingle Point (68° 56'N 173° 12'W) 9 July 1963, 117076. *Poa glauca* Vahl., Que., Fort Chimo, 9 Aug. 1948, 38753. *Poa nemoralis* L., Ont., Algoma Dist., Coppermine Pt., 20 Aug. 1935, 148213. *Poa palustris* L., Ont., Rainy River Dist., Atikokan, 26 Aug. 1971, 143007. *Poa pratensis* L., Ont., Carl. Co., Ottawa, July 1916, 140569. *Puccinellia angustata* (R. Br.) Rand & Redf., N.W.T., Ellesmere I., Hazen Camp (81° 49'N 71° 21'W), 3 Aug. 1972, 91193. *Secale cereale* L., N.S., Kings Co., Berwick, 26 June 1952, 38670. *Triticum aestivum* L., Ont., Middlesex Co., Granton, 21 June 1891 (Dearness 713).

NOTES: The cereals barley, rye and wheat are often mildewed in Canada, and infection is sporadically severe on winter wheat. Oats were reported mildewed in Eastern and Western Canada by Connors (An annotated index of plant diseases in Canada. Res. Br., Can. Dept. Agr. Publication no. 1251, 1967) but there are no specimen vouchers. For Scandinavia, Junell (Erysiphaceae of Sweden. Symb. Bot. Upsal. XIX. 1. 1-117. Uppsala. 1967) reported that oats are less severely attacked than other cereals. Merion Bluegrass (*Poa pratensis* L. cv.) is a prime component of Canadian lawns and regularly becomes mildewed. Mildew builds up over the summer especially where the lawn is shaded. At the Central Experimental Farm in Ottawa, one particular lawn, shaded by some large willows, becomes heavily mildewed every year. This lawn is a mixture of Merian Blue and Annual Bluegrass (*Poa annua* L.) but only the Merian Blue becomes mildewed. Host resistance is here in evidence. Resistance and physiological specialization was summarized by Connors (op. cit.) in his treatment of mildew on barley, and Kapoor, J.N. (C.M.I. descriptions of Pathogenic Fungi and Bacteria no. 153, 1967) also offered a number of references to the physiological specialization of *E. graminis*.

Perithecia with asci are present on most of the Canadian specimens in DAOM. In all of these, hosts were of current year growth and asci do not contain ascospores. Foster and Henry (Can. J. Res. C, 15: 547-559. 1937.) reported that cleistothecia overwinter and form ascospores by the month of March. Kapoor (op. cit.) describes ascospores as 4-8/ascus, ellipsoid, hyaline to pale brown, 20-24 \times 10-14 μ , formed after the host plant has dried up. Ascospores are generally accepted as being the primary inoculum, but Johnston (Can. Plant Disease Survey 54: 71-73. 1974) cited European authors who claim that overwintering conidia may be the more effective primary inoculum.

Evidence for the world wide distribution of this fungus has been documented by K. Hirata (Host range and geographical distribution of the powdery mildews. Faculty of Agriculture, Niigata Univ., Niigata, Japan. 1966).

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