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Hyphomycetes from Korean Soil. II. The genus *Aspergillus* and some other microfungi.

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韓國 土壤中의 絲狀菌에 관한 硏究. Ⅱ. *Aspergillus*屬과 그외 菌類에 關하여

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ABSTRACT

Fourteen species of the hyphomyceteous fungi isolated from Korean soils are described and illustrated. Among these, one species has teleomorphic state and is identified as *Emericella nidulans* var. *nidulans*, similar to *Emericella spectabilis* with the exception of size of the conidiophores as well as color and the arrangement of the hülle cells. Four species of hyphomyceteous fungi, *Chrysosporium pannorum*, *Doratomyces microsporus*, *Trichoderma koningii*, *T. viride*, are reported here for the first time in Korea.

INTRODUCTION

In the course of investigation of the microflora of soils in Korea, a number of the hyphomyceteous fungi have been examined in which sixteen species of the genus *Penicillium* were described in the previous paper as the first records from the Korean soils.

As a succesive work of the Hyphomycetes occurring in Korean soils, fourteen species of hitherto described and undescribed fungi were obtained and observed.

An interesting isolate, belonging to a typical category of the cleistothecial ascomycetes, is photographed and described in this paper.

Representative strains of the fungi described in this paper have been deposited in the Institute for Fermentation, Osaka.

***Aspergillus flavus* Link**

Link, Species Plantarum Ⅵ, p. 66 (1824); Raper & Fennell, The genus *Aspergillus*, p. 361 (1965).

Syn. *Eurotium flavus* De Baryet Woronin (1870); *Aspergillus variabilis* Gasperini(1887); *A. pollinis* Howard(1896); *A. wehmeri* Cost. et Lucet(1905); *A. siebenmanni* Cost. et Lucet

(1905); *A. pseudoflavus* Saito(1907); *Sterigmatocystis pseudo-flava* (Saito) Sacc.

Colonies on Czapek agar growing rapidly, usually heavily sporulating, consisting of more or less close-textured basal mycelium, commonly plane but sometimes radially furrowed or wrinkled, forming abundant conidial structures, young conidial heads with yellow green shade, but fading to pale brownish green in age; reverse usually colorless.

Colonies on malt extract agar growing broadly, consisting of loose-textured, floccose or somewhat granular conidial structures, with well developed aerial hyphae and abundant conidia, young conidial areas becoming yellowish green to pale yellowish green shade in age; reverse colorless or somewhat pale yellowish brown.

Colonies on potato sucrose agar growing rapidly, with abundant vegetative mycelium, longer stalked conidial structures and granules of abundant spores, conidial areas usually pale brownish green after the maturation of conidia; reverse colorless.

Conidial heads radiate or finely columnar. Conidiophores with thicker wall, coarsely roughened on the surface, variable in length but up to 11.5mm long, 10μ in diameter. Vesicles elongate when young, becoming subglobose to globose in age, measuring 30~44μ in diameter. Phialides on vesicles uniseriate or biseriate, primaries 10~24×4.7μ, secondaries 12×4μ, uniseriate phialides mostly 10×4μ. Conidia typically globose to subglobose, echinulate, variable from 4μ to 4.5μ in diameter but mostly 4.5×4.5μ.

Habitat: Isolated from soils; Seongryu cave, Ulchin, Kyungbuk, June 5, 1978 and March 9, 1980, SUB 129, K.H. Min and Sampungri, Yunpungmyun Geisan, Chungbuk, March 4, 1979, SUB 34, 40 and 44, K.H. Min.

Notes: This species is very common in Korean soils and also on foods. This fungus has frequently been reported in Korea (B.H. Lee *et al*, 1968, Y.N. Lee *et al.* 1976, and S.J. Kim, 1971), but is easily confused of *Aspergillus oryzae*.

Aspergillus flavus Link var. ***columnaris*** Raper et Fennel

Raper & Fennell, The genus *Aspergillus*, p. 366(1965).

Syn. *Aspergillus flavus* Link var. *asper* Sasaki(1950); *A. sojae* Sakaguchi et Yamada f. sp. *flavo-viride* Ohmasa, Kawada et Nagashima (1950); *A. oryzae* (Ahlburg) Cohn var. *sporoflavus* Ohara(1953); *A. oryzae* var. *variabilia* (Gasperini) Ohara(1953).

Colonies on Czapek agar growing moderately, consisting of aerial mycelium, uniformly velvety or becoming lanose-like at acentral area, conidial areas pale brownish green in age; reverse yellowish brown with agar pigmented yellowish.

Colonies on malt extract agar growing moderately, surface plane and velvety, heavily sporing, forming granules of conidial structures after the maturation of conidia, conidial areas becoming green shades in age; reverse pale orange-brown.

Colonies on potato sucrose agar growing moderately, plane and velvety, consisting of poor vegetative mycelium, with crust formation of conidia, conidial structures becoming pale green color in age; reverse commonly pale orange brown.

Conidial heads mostly columnar, but radiate in young. Conidiophores finely roughened, variable, sometimes 160μ long by 9μ in diameter. Vesicles clavate when young, becoming subglobose in age, mostly 20μ in diameter. Phialides almost uniseriate, measuring 8—10×4μ. Conidia globose to subglobose, echinulate, variable from 4μ to 6μ in diameter, but mostly

6×6μ.

Habitat: Isolated from soils; Sampungri, Yunpungmyun, Geisan, Chungbuk, March 4, 1979, SUB 35, K.H. Min, and Chungpadong, Yongsanku, Seoul, Oct. 7, 1979, SUB 39, K. H. Min.

Notes: This fungus is very close to *Aspergillur flavus* with the exception of conidial heads, phialides and conidial area's color as well as reverse color in three agar media. This species was reported by Y.N. Lee *et al.*(1976).

Aspergillus fumigatus Freseius

Fresenius, Beitr. Mykol. p. 81(1863); Thom & Church, The Aspergilli, p. 129(1926); Thom & Raper, Manual of the Aspergillus, p. 148 (1945); Raper & Fennell, The genus Aspergillus, p. 242(1965).

Syn. *Aspergillus aviarius* Peck (1891); *A. quininae* Heim(1894); *A. bronchialis* Blumentritt(1901); *A. virido-griseus* Cost. and Lucet (1905); *A. cellulosae* Hopffe(1919); *A. septatus* Sartory et Sartory(1943).

Colonies on Czapek agar growing rapidly, extremely floccose, at first consisting of abundant white mycelium, becomg green to grayish green accord to the development of conidial heads in age; reverse commonly pale greenish brown.

Colonies on malt extract agar growing broadly, more loosely textured and more heavy sporulating over the abundant white mycelium, extremely lanose or floccose, conidial structures becoming dark grayish green with the conidial development; reverse pale brownish gray as on Czapek agar.

Colonies on potato sucrose agar spreading well, extremely lanose or floccose, composing of abundant mycelium, at first white, but gradually appearing grayish green in age; reverse usually colorless.

Conidial heads completely compact columnar. Conidiophores short, smooth-walled, mostly 100×4μ, erecting directly from submerged hyphae or from very short branches aerial hyphae, gradually enlarging upward and terminating into an apical flask-shaped vesicle. Vesicles usually 16~18μ in diameter. Phialides uniseriate, measuring 4~7×3μ, usually fertile on the upper half only. Conidia echinulate, globose to subglobose, mostly 2.2×2.2μ.

Habitat: Isolated from soils; Seongryu cave, Ulchin, Kyungbuk, June 5, 1978 and March 5, 1980, SUB 130, K.H. Min. Kosuri, Danyang, Chungbuk, Jan. 15, 1979, SUB 63, 65, 87 and 120, K.H. Min. Chunhodong, Seoul, March 6, 1979, SUB 55, and Sampungri, Geisan, Chungbuk, March 4, 1979, SUB 16, K.H. Min. Experiment Forest of the Seoul National University, Suweon, Kyunggi, July 22, 1975, A-1-1, T. Yokoyama. Kwangneung, Kyunggi, July 23, 1975, B-2-1, B-4-4, B-5-3 and B-11-5, T. Yokoyama. Buyeo, Chungnam July 26, 1975, C-1-6, C-2-5, C-2-6 and C-4-12, T. Yokoyama. Beobju Temple, Sogrisan, Boeumgun, Chungbuk, Oct. 8, 1978, HK 42-1703-1, HK42-1704-1, HK42-1709-1 and HK42-1713-1, T. Yokoyama. Goesan, Goesangun, Chungbuk, Oct. 10, 1978, HK42-1951-1, HK42-1953-1, HK42-1954-1, HK42-1969-1 and HK42-1970-1, T. Yokoyama. Osan, Kyunggi, Oct. 11, 1978, HK42-1960-1, HK42-1962-1, and HK42-1966-1, T. Yokoyama. Mt. Hanra, Bugjejugun, Jeju, Oct. 12, 1978, HK42-1778-1, T. Yokoyama.

Notes: This fungus is very common in Korean soils. This species was previously reported by B.H. Lee *et al.*(1968), S.J. Kim(1971), and Y.N. Lee *et al.*(1976).

Aspergillus japonicus Saito. var ***japonicus***

Saito, Botan. Mag. (Tokyo) *20*. p. 61(1906); Raper & Fennell, The genus *Aspergillus*, p. 327 (1965); Al-Musallam, Riv. black *Aspergillus*

species, p. 28(1980).

Syn. *Aspergillus japonicus* Saito var. *atrofuscus* Iizuka(1953); *A. japonicus* var. *capillatus* Nakazawa, Takeda et Suematsu (1932); *A. atro-violaceus* Mosseray(1934); *A. brunneo-violaceous* Batista and Maia(1955).

Colonies on Czapek agar growing rapidly, consisting of textured, white, wrinkled basal mycelium, with abundant sporulation and granules of conidial structure, conidial areas becoming gradually purple black shades with the maturation of conidia in age; reverse at first colorless but later becoming slightly purplish gray.

Colonies on malt extract agar growing rapidly, more abundantly sporulating, conidial heads commonly larger, split into columns, conidial structures becoming purplish black in age; reverse colorless or pale brown.

Colonies on potato sucrose agar growing well, consisting of dense, irregularly wrinkled basal mycelium, but forming abundant conidial crusters in age, conidial structures becoming gradually purplish black with the maturation of conidia; reverse colorless or pale yellow brown.

Conidial heads at first radiate but becoming columnar. Conidiophores smooth-walled, varying in length, mostly 1300μ long, 10μ in diameter. Vesicles somewhat elongate but more nearly globose in age, mostly 24~32μ, fertile on most of their surface in normal heads but only on the apex in small heads. Phialides uniseriate, 6~7×4μ. Conidia mostly globose or subglobose, conspicuously echinulate, commonly 4μ in diameter.

Habitat: Isolated from soils; Jaedong, Chongroku, Seoul, Sept. 5, 1979, SUB 27, K.H. Min and Kusanri, Ulchin, Kyungbuk, Feb. 1, 1979, SUB 26, K.H. Min.

Notes: This fungus was previously reported by the several workers(S.J. Kim, 1971 and Y.N. Lee *et al.* 1976).

Aspergillus niger Van Thieghem

Van Thieghem, Ann. Sci. Nat. Botan., 8: p. 240(1867) : Thom & Currie, J. Agr. Res. 7 : 1(1916); Thom & Church, The *Aspergilli*, p. 167(1926); Thom & Raper, A Mannal of the *Aspergilli*, p. 216(1945); Raper & Fennell, The genus *Aspergillus*, p. 309(1965).

Syn. *Sterigmatocystis nigra* V. Thieg. (1877); *Aspergillus nigricans* Wreden (1867); *A. nigriceps* Berk. et Curt. (1888); *A. fumaricus*(Wehmer) Thom et Church(1926); *A. fuliginosus* Peck(1934).

Colonies on Czapek agar growing, consisting of compact to loosely, white to more or less yellow basal mycelium, conidial structures erecting and sporulating in abundance with maturation, conidial areas usually black color in age; reverse commonly colorless, sometimes with pale yellow pigmentation.

Colonies on malt extract agar spreading broadly, slightly flocculent, with abundant sporulation throughout, consisting of white or pale yellow basal mycelium that is submerged and bears black to very deep brownish black conidial structures in conidial areas; reverse colorless or pale yellow.

Colonies on potato sucrose agar growing rapidly, slightly flocculent, basal mycelium white to pale yellow, heavily sporulating with the maturation of conidial structures, conidial chains large, conidial areas at first white but becoming carbonaceous black to deep brownish black; reverse usually white or pale yellow.

Conidial heads large, black colored, at first globose but becoming radiate or splitting into defined columns in age. Conidiophores variable in length, 12~16μ in diameter, colorless, with smooth and thick walled. Vesicles globose or subglobose measuring 34~52μ, mostly 46μ in diameter. Phialides biseriate, primeries variable in length, secondaries 6×3.5μ. Conidia globose, conspicuously roughened at maturation,

usually 3~4.5μ, but mostly 3μ in diameter.

Habitat: Isolated from soils; Seongryu cave, Ulchin, Kyungbuk, June 5, 1978, K.H. Min, and Kosuri, Danyang, Chungbuk, Jan. 15, 1979, SUB 80, 25, 82, K.H. Min, Chun-hodong, Kangnamku, Seoul, March 6, 1979, SUB 76, 77, 81, K.H. Min and Chungpadong, Yongsanku, Seoul, Oct. 7, 1979, SUB 100, 101, 102, K. H. Min.

Notes: This fungus is very common in Korea soils. Isolation of this species was recorded by several workers (B.H. Lee *et al.* 1968, S. J. Kim, 1971 and Y.N.Lee *et al.* 1976).

Aspergillus oryzae (Ahlburg) Cohn

Cohn, Jahresber. schles. Ges. vaterl. Kulturn (1883) **61** : 226(1884); Raper & Fennell, The genus *Aspergillus*, p. 370(1965).

Syn. *Eurotium oryzae* Ahlb. (1878); *A. candidus* Link var. *amylolyticus* Takaoka(1949); *A. flavus* Link var. *oryzae*(Ahlb.) Saito(1957); *A. mannitosus* Otani(1957); *A. oryzae* var. *flavus* Sakaguchi et Yamada(1957).

Colonies on Czapek agar growing rapidly, consisting of loose-textured abundant vegetative mycelium and long-stalked conidial structures with granules of conidial areas, at first white, becoming dullbrown in age; reverse usually in colorless.

Colonies on malt extract agar growing rapidly, surface more plane than on Czapek agar, conidial areas becoming pale brownish green in age; reverse usually pale brown or orange brown color.

Colonies on potato sucrose agar growing moderately, more or less nearly plane or velvety, abundantly sporulating, conidial areas commonly showing brownish green shade with the maturation of conidia; reverse pale orange brown in age.

Conidial heads radiate, conidial chains divergent or loosely columnar. Conidiophores erect from the substratum, variable in length 6μ in diameter, but 10~12μ in diameter at the enlarged base, more or less rough-walled. Vesicles commonly subglobose, sometimes flask shaped, covering with phialides on the whole surface, variable in diameter up to 22 to 28μ. Phialides variable in length, but usually in one series up to 8-10×4μ, or in two series with primany phialides 10×5μ and secondary phialides 9×3.5μ. Conidia commonly globose or subglobose in age, usually 4-6μ but mostly 5μ in diameter.

Habitat: Isolated from soils; Experiment Forest of the Seoul National University, Suweon, Kyunggi, July 22, 1975, A-14-5, T. Yokoyama. Seongryu cave, Ulchin, Kyungbuk, June 5, 1978, K.H. Min, and March 9, 1980, SUB 128, K.H. Min, and Sampungri, Yunpungmyun, Geisan, Chungbuk, observed on March 4, 1979, SUB 33, 37, 43, 56 and 59, K.H. Min.

Notes: This fungus is very common in Korea. The species has been reported from Korea (B.H. Lee *et al.* 1968, S.J. Kim, 1971, and S.S. Kim *et al.* 1972).

Aspergillus sydowi(Bain. & Sar.) Thom & Church.

Bainier & Sartory, Ann. Mycol. **11** : p. 25 (1913); Thom & Church, The *Aspergilli*, p. 147(1926); Raper & Fennell, The genus *Aspergillus*, p. 450(1965).

Syn. *Sterigmatocystis sydowi* Bainier and Sartory(1913); *S. cameleo* Sartory, Sartory et Meyer(1930); *S. tunetana* Langer.(1924); *Aspergillus sydowi* var. *achlamidosporus* Nakazawa, Simo et Watanabe(1934); *A. sydowi* var. *inaequalis* Nakazawa, Takeda et Suematsu (1934).

Colonies on Czapek agar growing rapidly, more or less floccose from tailing hyphae bearing conidial structures, or velvety, close textured, conidial structures arising from subs-

tratum in most strains, conidial areas blue-green color; exudate abundant, reddish brown shades; reverse commonly red-shades in color.

Colonies on malt extract agar growing rapidly, usually velvety, composed of a loose network of aerial hyphae, abundantly sporulating, conidial structures arising from the submerged mycelium, conidial heads usually more blue green color in age; exudate lacking but sometimes present; reverse commonly pale red or dull red.

Colonies on potato sucrose agar spreading broadly, abundantly sporulating with the maturation, surface usually velvety, conidial areas blue green color in age; exudate usually abundant, yellowish brown; reverse reddish brown shades.

Conidial heads at first globose, typically radiate or sometimes columnar in age. Conidiophores arising from submerged hyphae, variable in length, 3~10μ, but mostly 4μ in diameter, smooth-walled. Vesicles nearly globose, 10~12μ in diameter. Phialides in two series, primaries 4~6×2~3μ, secondaries 5~8×2.5μ. Conidia commonly globose to subglobose, 2.5~3.5μ, but mostly 2.5×3.0μ in diameter, usually conspicuously echinulate.

Habitat: Isolated from soils; Odongdong, Masansi, Kyungnam, March 30, 1979, SUB 93, 112, 113, K.H. Min, Shinlimdong, Kwanaku, Seoul, March 16, 1979, SUB 107, K.H. Min, and Chunhodong, Kanamku, Seoul, March 6, 1979, SUB 73, 109, 123, K.H. Min.

Notes: This fungus has previously been decribed by S.J. Kim(1971).

Aspergillus versicolor (Vuill.) Tiraboschi

In Thom & Church, The *Aspergilli*, p.142 (1926); Vuillemin, in B. Mirsky, These de medecine. Nancy, No. 27, p.15(1903); Tiraboschi, Ann. Bot. (Rome) 7 : 9(1908~1909); Thom & Raper, A Manual of the *Aspergilli*, p.190(1945); Raper & Fennell, The genus *Aspergillus*, p.445(1965).

Syn. *Sterigmatocystis versicolor* Vuillemin (1903), *A. versicolor* Tiraboschi(1908~1909).

Colonies on Czapek agar growing slowly, usually consisting of abundant conidiophores arising from the substratum, surface velvety, but raised around the central areas, with conidial areas at first white, becoming light yellow-green in age; exudate dark red color; reverse usually purplish red or brownish gray.

Colonies on malt extract agar growing slowly, usually velvety, heavily sporulating throughout, conidial structures arising from submerged mycelium, central areas raised remarkably, in some portion pale yellow and in other portion blue green or green color; reverse at first colorless but becoming purplish brown in age.

Colonies on potato sucrose agar spreading slowly, consisting of abundant conidial structures arising from submerged mycelium, velvety, with closely interwoven hyphae, conidial areas usually light yellow green to green shades in age; reverse purplish brown shades.

Conidial heads globose when young but appearing split or radiate or loosely columnar in age. Conidiophores heavy and smooth walled, variable in length 6~7μ in diameter. Vesicles globose to subglobose, 15~18μ in diameter. Phialides in two series, primaries commonly 4~6 x 3μ, secondaries 4~7x 2.5μ. Conidia globose, delicately echinulate, mostly 2.5~3μ in diameter.

Habitat: Isolated from soils; Odongdong, Masansi, Kyungnam, March 30, 1979, SUB 7, 22, 64, K.H. Min, Shinlimdong, Kwanaku, Seoul, March 16, 1979, SUB 85, 122, K.H. Min, and Chunhodong, Kangnamku, Seoul, March 6, 1979, SUB 96, 121, K.H. Min.

Notes: This fungus is very common in Korean soils in this experiment and has been de-

scribed previously by S.J. Kim(1971).

Alternaria alternata (Fr.) Keissler

Keissler, Beih. Bot. Zbl., 29 : 434(1912); Neergaard, Danish species of *Alternaria* and *Stemphylium*, p. 87(1945); Ellis, Dematiaceous hyphomycetes, p. 465(1971).

Syn. *Torula alternata* Fr. (1832); *Alternaria tenuis* C.G. Nees(1816~1817).

Colonies on Czapek agar growing rapidly, consisting of abundant conidial strucutres and mycelium, floccose, at first grayish brown, but becoming black in age; reverse usually colorless or grayish black.

Colonies on malt extract agar growing rapidly, at first consisting of white mycelia and conidial structures, floccose, conidial areas white-brown color; reverse commonly pale brown to black.

Colonies on potato sucrose agar growing broadly, at first composed of abundant white mycelia and conidial structures, but becoming grayish brown or pale brown in age, floccose or lanose; reverse commonly black.

Conidiophores usually arising singly, simple or branched, straight or flexuous, golden brown to black, smooth. Conidia usually formed in long branched chains, obclavate, obpyriform, or ellipsoidal, with a cylindrical beak, golden brown, smooth or verrucose, with several transverse and longitudinal septa, measuring 24~60×10~22.5μ.

Habitat: Isolated from soils; Seongryu cave, Ulchin, Kyungbuk, observed June 5, 1978, K.H. Min and Chunhodong, Kangnamku, Seoul, March 6, 1979, SUB 79, K.H. Min.

Notes: This fungus is cosmopolitan on many kinds of substrates and has been described as *Alternaria tenuis*(D.Y. Lee, 1978).

Chrysosporium pannorum (Link) Hughes

Hughes, Can. Bot. **36** : 749(1958) & Mycologia **62** : 799, 815(1970); Carmichael, Can. J. Bot. **40** : 1137(1962); Barron, The genera of hyphomycetes from soil, p. 125(1968).

Syn. *Sporotrichun pannorum* Link(1824), *Aleurisma carnis*(Brookset Hansf.) Bisby(1944), *Aleurismalugdunese* Vuill. (1924).

Colonies on Czapek agar growing slowly, consisting of close textured basal felt, powdery to velvety, conspicuously wrinkled. poorly sporulating on the fertile hyphae, conidial areas whitish gray in age; reverse colorless.

Colonies on malt extract agar growing slowly, closed mycelial felt errect, powdery to velvety, poor basal mycelium, conidial areas white to pale yellow or gray in age; reverse colorless.

Colonies on potato sucrose agar spreading poorly, flat and powdery, white at the center, cream to pale yellowish brown at the periphery of conidial areas; reverse colorless.

Condiophores poorly differentiated, not distinguished from the vegetative hyphae, erecting and branching from substrate mycelium in irregular fashion, hyaline, septate. Conidia hyaline, nonseptate, globose to subglobose, pyriform or clavate, 3~4 x 2.5μ, with a basal scar, terminal or intercalary or in branching chains, sometimes formed by basipetal septation from sporogenous hyphae in the manner of aleuriospore formation.

Habitat : Isolated from soil; Chungpadong, Yongsanku, Seoul, Oct. 7, 1979, SUB 9, K.H. Min.

Notes : This fungus is common in soils but is recorded here for the first time in Korea.

Doratomyces microsporus (Sacc.) Morton & Smith

Morton & Smith, Mycol. Pap., **86** : 77(1963); Ellis, Dematiaceous hyphomycetes, p. 329 (1971).

Syn. *Stysanus microsporus* **Saccardo(1878)**: *Graphium graminum* Cooke(1887).

Colonies on Czapek agar growing slowly, developing sparsely small colonies, but heavily sporulating, composed of white basal mycelium, conidial areas usually grayish brown to near black; reverse colorless.

Colonies on malt extract agar growing slowly and sparsely, abundantly sporulating after maturation, with white basal mycelium, conidial areas near black to dark brown; reverse colorless.

Colonies on potato sucrose agar growing slowly and sparsely, heavily sporulating in age, with granules of conidial heads, conidial areas usually grayish brown shades to nearly black; reverse colorless.

Synnemata usually 200μ long, with long cylindrical heads. Conidia commonly small, smooth-walled, ovoid with a truncate base, apex rounded, measuring 2—2.5×4—5μ.

Habitat : Isolated from soil : Odongdong, Masansi, Kyungnam, March 31, 1979, SUB 32, K.H. Min.

Notes : This species is characterized with the synnemata, small conidial structures and conidia. The fungus is described here for the first time in Korea.

Trichoderma koningii Oud aggr, sensu Rifai

Oudemans & Koning, Archs neerl. Sci., Ⅱ **7** : 291(1902); Rifai, Mycol. Pap. 116 : 31(1969).

Syn. *Acrostalagmus koningii* (Oud.) Duche & Heim(1931).

Colonies on Czapek agar growing moderately, at first consisting of whitish mycelium, then forming conidial structures sparsely on surface of the colony, conidial areas blue green in age; reverse usually colorless.

Colonies on malt extract agar growing well, at first consisting of mycelium, surface lanose or floccose, conidial maturation appearing at the marginal areas, blue green in age; reverse pale yellow color or brownish yellow color.

Colonies on potato sucrose agar growing moderately, at first consisting of white mycelium on surface, becoming lanose or floccose, blue green in age; reverse colorless.

Conidiophores much branched, forming loose tufts on surface. Phialides narrower at the base than at the middle, attenuated to their conical apices, measuring 8~9 × 2.6μ, sometimes more longer. Phialoconidia elliptical or cylindrical with a rounded apex, measuring mostly 3.9×2.6μ, but up to 5.2×3.1μ in larger ones.

Habitat : Isolated from soils : Experiment Forest of the Seoul National University, Suweon, Kyunggi, July 22, 1975, A-1-3, T. Yokoyama. Jaedong, Chongroku, Seoul, Sept. 5, 1979, SUB 23, K.H. Min, and Chungadong, Yongsanku, Seoul, Oct. 7, 1979, SUB 95, K·H. Min.

Notes : This fungus is very common in Korean soils and characterized by its conidial structures and smooth, elliptical conidia.

Trichoderma viride Pers. ex S.F. Gray aggr. sensu Rifai

Gray, Nat. Arrang. br. Pl. **1** : 560(1821); Fries, Syst. mycol. **3** : 215(1829); Rifai, Mycol Pap. **116** : 47(1969).

Syn. *Trichoderma lignorum* Tode ex Harz (1871); *Trichoderma truncorum* Bain (1906); *Sporoderma chlorogenum* Mount. (1856); *Sporotrichum narcissi* Tochinai & Shimada (1930).

Colonies on Czapek agar growing moderately, at first consisting of white and sparse mycelial, smooth but changing to hairy by the formation of loose aerial hyphae, colony margin becoming dark green with the maturation of conidia; reverse colorless.

Colonies on malt extract agar growing moderately, at first consisting of abundant white mycelium, but becoming poor in accordance

with the formation of dark green conidial structures; reverse orange brown.

Colonies on potato sucrose agar growing moderately, at first consisting of white mycelial structures, then heavily sporulating with poor mycelial structures in age; reverse colorless.

Conidiophores borne on aerial hyphae, errect, single or somewhat compact, at first spreading on the surface, variable in length, 4.0μ in diameter. Phialides formed in several whorls beneath each terminal phialides, sometimes arising singly or in opposite pairs along the branches, variable in size but mostly 10×3.0μ. Phialoconidia globose or short obvoid, distinctively rough-walls, appearing somewhat angular 3—4×4μ.

Habitat : Isolated from soils; Seongryu cave, Ulchin, Kyungbuk, June 5, 1979, K.H. Min and March 9, 1980, SUB 135, K.H. Min.

Notes : This species is commonly observed in soils and has been reported by serveral workers in Korea as the cellulase producing strains.

Emericella nidulans (Eidam) Vuill. var. ***nidulans***

Vuilleman, Compt. Rend., **184** : 137(1927); Benjamin, Mycologia 47 : 679(1955); Raper & Fennell, The genus *Aspergillus*, p. 495(1965).

Syn. *Diplostephanus nidulans* (Eidam) Langeron(1922).

Anamorphic state. *Aspergillus nidulans* (Eidam) Wint.(1884).

Syn. *Sterigmatocystis nidulans* Eidam(1883).

Colonies on Czapek agar growing rapidly, at first white, but becoming olive-buff or pale greenish yellow with the development of cleistothecia, surface granular or thin; reverse dark brown or grayish brown color.

Colonies on malt extract agar growing rapidly, conidial areas becoming dark green color, mixed with the granules of pale yellowish cleistothecia, surface wrinkled; exudate abundant, in large drops, clear to pale yellow; reverse at first pale yellow, then becoming to grayish brown.

Colonies on potato sucrose agar growing mederately, central areas raised and more or less wrinked, conidial areas green shade in age, mixed with pale yellowish cleistothecia; reverse usually pale brown or pale orange brown color.

Conidial heads short columnar. Conidiophores smooth-walled, variable in length, but mostly 18~23×5.2μ. Vesicles usually 13μ in diameter. Phialides in two series, primaries 5.2×2.6μ and secondaries 5.2×2.6μ. Conidia globose, more or less rough-walled, measuring 2.6~3.2μ in diameter.

Ascomata dark violet, developing over the matured portion of colonies in age, globose, variable in size, but mostly 140μ in diameter, surrounded by the layer of hyphae bearing hülle cells. Hülle cells, variable in size, but usually 13~18μ in diameter. Asci globose to subglobose, usually 12×13μ. Ascospores orange red to vinaceous, lenticular, smooth-walled with two equatorial crests of 0.5~1.3μ wide, 4~4.5×3.2~3.5μ.

Habitat: Isolated from soils; Experiment Forest of the Seoul National University, Suweon, Kyunggi, July 22. 1975, A-10-3, T. Yokoyama. Buyeo, Chungnam, July 26, 1975, C-2-3, T. Yokoyama. Kosuri, Danyang, Chungbuk, Jan. 15, 1979, SUB 31, K.H. Min.

Notes: This fungus was described as *A. nidulans* by B. H Lee *et al*, 1968 and S.J. Kim, 1971. Hower, teleomorphic state of this fungus is recorded at the ferst time in this paper.

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摘 要

韓國 土壤菌의 계속적인 硏究로서, 分離된 菌類中 *Aspergillus*屬 8種과 microfungi 5種인 *Alternaria alternata*, *Chrysosporium pannorum*, *Doratomyces microsporus*, *Trichoderma koningii*, *T. viride*에 關하여 報告하였다. 이들 同定된 菌類 中 아직까지 韓國에서 未記錄된 것으로는 *Chrysosporium pannorum*, *Doratomyces microsporus*, *Trichoderma koningii*, *T. viride* 등의4種이었다. 또한 完全世代인 *Emericella nidulans* var. *nidulans*에 關하여도 報告하였다.

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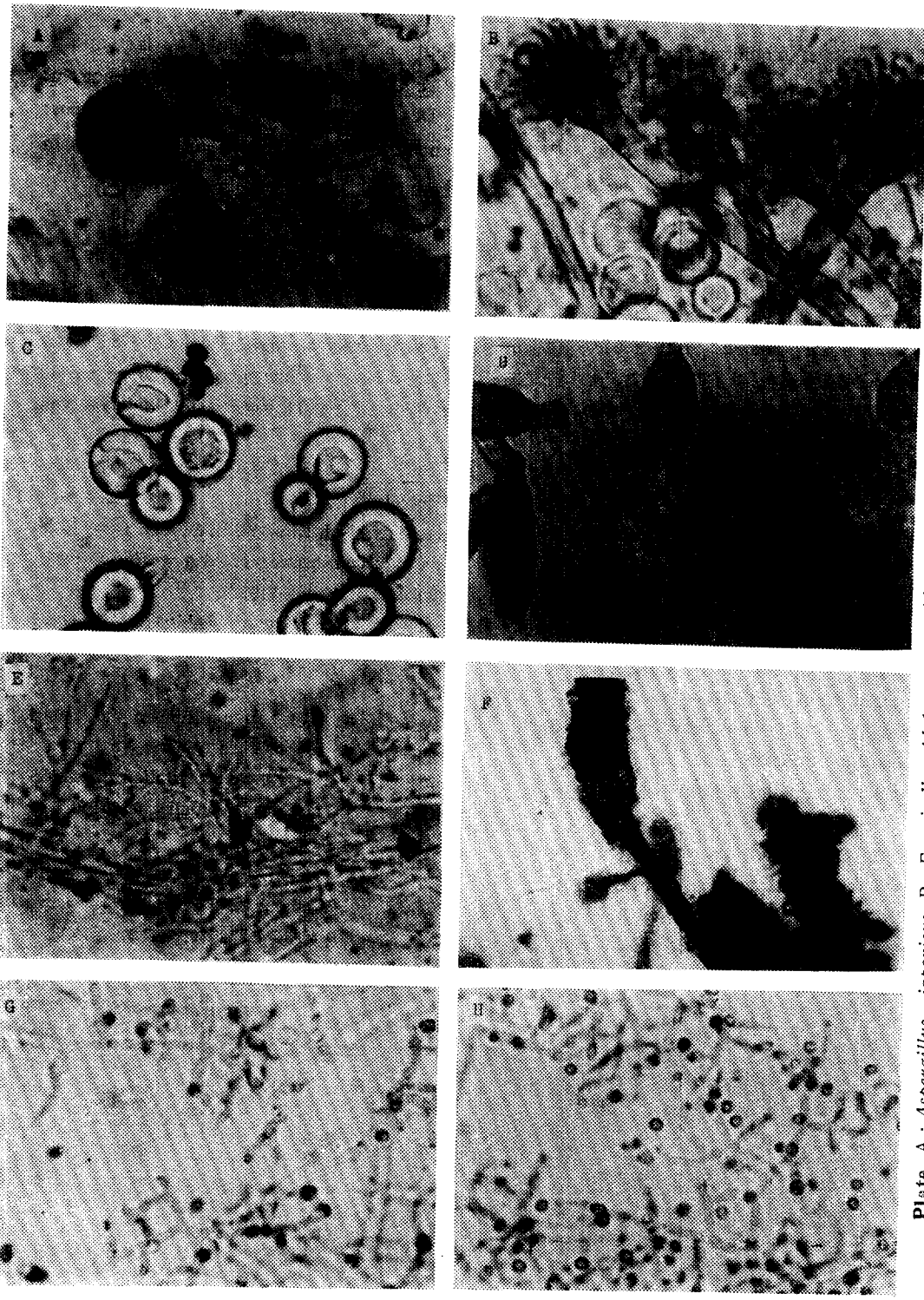

Plate. A : *Aspergillus. japonicus*, B : *Emericella nidulans* var. *nidulans*, C : Hülle cells and ascospores of *E. nidulans* var *nid-* D : *Alternaria alternata*. E : *Chrysosporium pannorum*, F : *Doratomyces microsporus*. G : *Trichoderma* *T. viride* (ca×400).