Pseudomonas fuscovaginae sp. nov., nom. rev.

KUNIYUKI MIYAJIMA,1* AKIO TANII,2 and TADAHIKO AKITA3

Kitami Agricultural Experiment Station, Kusunno, Hokkaido 099-14,1 Tokachi Agricultural Experiment Station, Memuro, Hokkaido 082,2 and Central Agricultural Experiment Station, Iwamizawa, Hokkaido 069-03,3 Japan

The name Pseudomonas fuscovaginae Tanii, Miyajima and Akita 1976 was omitted from the Approved Lists of Bacterial Names. Therefore, this name is here revived for the organism to which it originally referred. The cells of strains of this species are aerobic, gram negative, and rod shaped with polar flagella. They oxidize glucose in oxidation-fermentation medium, and they produce a green fluorescent pigment, oxidase, and arginine dihydrolase. Denitrification, β-glucosidase, pit formation on polypectate gel and growth at 37°C are negative. Characteristics that distinguish this species from other fluorescent pseudomonads which are positive for arginine dihydrolase and oxidase are its ability to produce a hypersensitivity reaction in tobacco plants and its inability to utilize 2-ketogluconate or inositol. These bacteria were pathogenic to Oryza sativa and eight other species of the Gramineae. The type strain is NCPPB 3085 (= PDDCC 5940).

The name Pseudomonas fuscovaginae was validly published by Tanii et al. (7) for the causative agent of sheath brown rot of rice plants. This name was omitted from the Approved Lists of Bacterial Names (5). In accordance with Rule 28a of the International Code of Nomenclature of Bacteria (2), we propose to revive the name according to the following description.

Pseudomonas fuscovaginae (ex Tanii et al. 1976) nom. rev. (fus. co. va. gi' nae, L. adj. fuscus fuscous; L. fem. n. vagina vagina, sheath; M. L. fem. n. fuscovaginae of a fuscous vagina). Gram-negative, nonsporeforming, rod-shaped cells with round ends, 0.5 to 0.8 by 2.0 to 3.5 μm. Cells occur singly or in pairs and are motile by means of one to four polar flagella.

After 4 to 5 days at 28°C on nutrient agar moderate growth consisting of white to light brown, smooth, glistening, raised, translucent, circular, butyrous colonies 3 to 5 mm in diameter is produced. A green fluorescent, diffusible pigment is produced on King's medium B. No slime is produced on nutrient agar containing 5% sucrose.

Metabolism of glucose is oxidative in Hugh-Leifson oxidation-fermentation medium. Catalase and Kovacs oxidase tests are positive. Denitrification is negative; nitrate is not reduced. The methyl red and Voges-Proskauer tests are negative. Lipolysis of margarine and Tween 80 is positive. No growth occurs in nutrient broth supplemented with 5% NaCl. Peptonization and reduction of litmus milk without coagulation are positive. Pits are not produced on polypectate gels at pH 8.5. Gelatin and starch are hydrolyzed, but esculin and arbutin are not. Arginine dihydrolase and ammonia are produced, but cytochrome oxidase, phenylalanine deaminase, urease, 2-ketogluconate, H2S, and indole are not produced. Levan is not produced from sucrose.

No organic growth factors are required. Acid is produced from glucose, arabinose, rhamnose, and mannitol but not from maltose, sucrose, raffinose, inulin, salicin, dextrin, adonitol, erythritol, inositol, dulcitol, or α-methylglucoside. Citrate, malonate, succinate, urate, acetate, β-alanine, l-valine, and l-lysine are utilized, but tartrate, hippurate, 2-ketogluconate, and polygalacturonic acid are not.

Aerobic. The optimal growth temperature is approximately 28°C. No growth occurs at 37°C. Characteristics that vary among strains of P. fuscovaginae are shown in Table 1.

<table>
<thead>
<tr>
<th>Character</th>
<th>Reaction of type strain</th>
<th>% Of strains positive (n = 16)</th>
<th>Strains that gave the less common result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tyrosinase</td>
<td>−</td>
<td>19</td>
<td>BA-1-1, 7101, 7106</td>
</tr>
<tr>
<td>Egg yolk reaction</td>
<td>+</td>
<td>81</td>
<td>BA-1-1, 705, 7101</td>
</tr>
<tr>
<td>Acid from: Xylose</td>
<td>−</td>
<td>94</td>
<td>6801</td>
</tr>
<tr>
<td>Mannose</td>
<td>+</td>
<td>94</td>
<td>IK-4</td>
</tr>
<tr>
<td>Lactose</td>
<td>−</td>
<td>81</td>
<td>BA-1-3, IK-2, 6801</td>
</tr>
<tr>
<td>Trehalose</td>
<td>+</td>
<td>94</td>
<td>705</td>
</tr>
<tr>
<td>Sorbitol</td>
<td>−</td>
<td>6</td>
<td>705</td>
</tr>
<tr>
<td>Growth in KCN broth</td>
<td>−</td>
<td>19</td>
<td>BA-1-2, BM-1, 7103</td>
</tr>
</tbody>
</table>

TABLE 1. Characteristics in which 16 strains of P. fuscovaginae differ from one another
TABLE 2. Characters of diagnostic value in distinguishing *P. fuscovaginae* from other fluorescent pseudomonads that are positive for arginine dihydrolase and oxidase

<table>
<thead>
<tr>
<th>Character</th>
<th><em>P. fuscovaginae</em> type strain</th>
<th><em>P. marginalis</em>&lt;sup&gt;a&lt;/sup&gt;</th>
<th><em>P. fluorescens</em> biotype&lt;sup&gt;b&lt;/sup&gt;</th>
<th><em>P. putida</em>&lt;sup&gt;b&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denitrification</td>
<td>−&lt;sup&gt;c&lt;/sup&gt;</td>
<td>+</td>
<td>+</td>
<td>−</td>
</tr>
<tr>
<td>Levan formation from sucrose</td>
<td>−</td>
<td>+</td>
<td>+</td>
<td>−</td>
</tr>
<tr>
<td>β-Glucosidase</td>
<td>−</td>
<td>+</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Gelatin liquefaction</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Utilization of:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L-Arabinose</td>
<td>+</td>
<td>+</td>
<td>−</td>
<td>+</td>
</tr>
<tr>
<td>Trehalose</td>
<td>+</td>
<td>+</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>2-Ketogluconate</td>
<td>−</td>
<td>+</td>
<td>+</td>
<td>−</td>
</tr>
<tr>
<td>Inositol</td>
<td>−</td>
<td>+</td>
<td>+</td>
<td>−</td>
</tr>
<tr>
<td>Sorbitol</td>
<td>−</td>
<td>+</td>
<td>+</td>
<td>−</td>
</tr>
<tr>
<td>Adonitol</td>
<td>−</td>
<td>+</td>
<td>d</td>
<td>−</td>
</tr>
<tr>
<td>Polygalacturonic acid</td>
<td>−</td>
<td>+</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Pits on polypectate gel (pH 8.5)</td>
<td>−</td>
<td>+</td>
<td>−</td>
<td>−</td>
</tr>
<tr>
<td>Hypersensitivity reaction in tobacco</td>
<td>+</td>
<td>−</td>
<td>−</td>
<td>−</td>
</tr>
</tbody>
</table>

<sup>a</sup> Data from Hildebrand and Schroth (1) and Lelliott et al. (3).
<sup>b</sup> Data from Sands et al. (4) and Stanier et al. (6).
<sup>c</sup> +, >90% of strains positive; −, <10% of strains positive; d, 10 to 90% of strains positive.

A hypersensitive reaction is produced when cells are inoculated into tobacco leaves, but potato soft rot is not produced.

Pathogenicity was demonstrated on *Oryza sativa*, *Hordeum vulgare*, *Triticum aestivum*, *Avena sativa*, *Zea mays*, *Lolium perenne*, *Bromus marginatus*, *Phleum pratense*, and *Phalaris arundinacea* but was not apparent on two species of the Solanaceae, six species of the Leguminosae, *Petroselinum crispum*, *Brassica oleracea*, *Lactuca sativa*, or *Citrus limon*. On *O. sativa*, water-soaked dark green spots appear first; then these spots become brown to dark brown blotches on the flag leaf sheaths. Infected young panicles show a brown to dark brown discoloration. On the other eight species of the Gramineae tested, water-soaked lesions appear between cells and become greyish white or reddish brown spots on the leaves.

*P. fuscovaginae* is similar to other fluorescent pseudomonads that are positive for arginine dihydrolase and oxidase (1, 3, 4, 6). Table 2 lists the characters which have diagnostic value for differentiating *P. fuscovaginae* from other species of this group. Table 2 shows that *P. fuscovaginae* is most similar to the saprophytes *Pseudomonas putida* and *Pseudomonas fluorescens* biotype G (6). There are consistent differences between *P. fuscovaginae* and *P. putida* in six characters (gelatin liquefaction; utilization of trehalose, 2-ketogluconate, and hippurate; starch hydrolysis; and hypersensitive reaction). *P. fluorescens* biotype G also differs in six characters (utilization of arabinose, 2-ketogluconate, inositol, sorbitol, and adonitol; and hypersensitive reaction).

Strains were isolated from diseased leaf sheaths of *O. sativa* in Japan.

The type strain of this species is 6801 (= NCPPB 3085 [National Collection of Plant Pathogenic Bacteria, Harpenden, England] = PDDCC 5940 [Plant Diseases Division Culture Collection, Auckland, New Zealand]).

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**LITERATURE CITED**


