NEW SPECIES

‘Pseudomonas saudimassiliensis’ sp. nov. a new bacterial species isolated from air samples in the urban environment of Makkah, Saudi Arabia

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Abstract

We report here the main characteristics of ‘Pseudomonas saudimassiliensis’ strain 12M76_airᵀ (CSUR P1220), a new species of the Pseudomonas genus that was isolated from air samples in the city environment of Makkah, Saudi Arabia, during the pilgrim period of Hajj 2012.

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As part of a wider culturomics [1] and metagenomics study [2] in Saudi Arabia we isolated a new bacterium named strain 12M76_airᵀ from air samples in the urban environment of Makkah, Saudi Arabia, during the pilgrim period of Hajj 2012. For each air sample, a volume of 1000 L was collected with an FCC-IV biological air sampler (AES Laboratories, Combourg, France) mounted with a nutrient agar plate containing the antifungal agent amphotericin (Majed Al-Buqami Co. BMC, Riyadh, Saudi Arabia) according to the manufacturer’s instructions. No identification was obtained for strain 12M76_airᵀ using our systematic matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS) screening on a MicroFlex spectrometer (Bruker Daltonics, Bremen, Germany) [3]. Strain 12M76_airᵀ was cultured in 5% sheep-blood-enriched Columbia agar (bioMérieux, Marcy l’Étoile, France) for 2 days in an aerobic atmosphere at 37°C. On Columbia agar colonies were opaque, round with grey colour and an average size of 1 mm in diameter. Growth of the strain 12M76_airᵀ was observed in both aerobic and anaerobic conditions. No growth was observed at pH values of 5.0 and 6.0, whereas growth occurred at alkaline pH with an optimum at pH ≥10. Strain 12M76_airᵀ is a Gram-negative, rod-shaped, motile, catalase-and oxidase-positive bacterium. Cells from fresh colonies grown on agar exhibit a mean diameter of 0.56 μm and a mean length of 1.22 μm in electron microscopy.

The complete 16S rRNA gene was sequenced using fD1-rP2 primers as previously described and a 3130-XL sequencer (Applied Biosciences, Saint Aubin, France) [4]. Strain 20_BNᵀ exhibited a 98.5% sequence similarity with Pseudomonas bauzanensis (NR117232.1), which was the phylogenetically closest species with standing nomenclature (Fig. 1). Consequently, it putatively classifies the strain 12M76_airᵀ as a new member of the genus Pseudomonas within the family Pseudomonadaceae in the phylum Proteobacteria. The genus Pseudomonas was first created in 1894 by Migula and an emended description of the genus Pseudomonas was proposed by Yang et al. in 2013 [5]. To date, more than 200 species have been described (http://www.bacterio.cict.fr/c/pseudomonas.html). Members of the genus Pseudomonas are...
mostly environmental bacteria widely distributed in soil, water and air [6].

Strain 12M76\(\text{air}^T\) exhibited a 16S rRNA gene sequence divergence >1.3% with \(P.\ bauzanensis\), the most closely related species with standing in nomenclature, which classifies it as a new representative of the \(Pseudomonas\) genus isolated from air samples from the city environment of Makkah, Saudi Arabia, during the pilgrim period of Hajj 2012. As a result, we propose the creation of \('Pseudomonas saudimassiliensis'\ sp. nov., and the strain 12M76\(\text{air}^T\) as the type strain.

**MALDI-TOF MS spectrum accession number.** The MALDI-TOF MS spectrum of \('Pseudomonas saudimassiliensis'\ strain 12M76\(\text{air}^T\) is available online (http://www.mediterranee-infection.com/article.php?laref=256&titre=urms-database).

**Nucleotide sequence accession number.** The 16S rRNA gene sequence of the strain 12M76\(\text{air}^T\) was deposited in GenBank under Accession number LM997413.

**Deposit in a culture collection.** Strain 12M76\(\text{air}^T\) was deposited in the Collection de Souches de l’Unité des Rick-\(\text{ettsies (CSUR, WDCM 875) under number P1220.}

**Transparency declaration**

The authors have no conflicts of interest to declare.

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**References**

[1] Angelakis E, Yasir M, Azhar EI, Papadioti A, Bibi F, Aburizaiza AS, et al. MALDI-TOF mass spectrometry and identification of new bacteria species in air samples from Makkah, Saudi Arabia. BMC Res Notes 2014;7:892.

[2] Angelakis E, Yasir M, Bachar D, Azhar EI, Lagier JC, Bibi F, et al. Gut microbiome and dietary patterns in different Saudi populations and monkeys. Sci Rep 2016;6:32191.

[3] Seng P, Rolain JM, Fournier PE, La Scola B, Drancourt M, et al. MALDI-TOF-mass spectrometry applications in clinical microbiology. Future Microbiol 2010;5:1733–54.

[4] Safont M, Angelakis E, Richet H, Lepidi H, Fournier PE, Drancourt M, et al. Bacterial lymphadenitis at a major referral hospital in France from 2008 to 2012. J Clin Microbiol 2014;52:1161–7.

[5] Yang G, Han L, Wen J, Zhou S. \(Pseudomonas guangdongensis\) sp. nov., isolated from an electroactive biofilm, and emended description of the genus \(Pseudomonas\) Migula 1894. Int J Syst Evol Microbiol 2013;63:4599–605.

[6] Stanier RY, Palleroni NJ, Doudoroff M. The aerobic pseudomonads: a taxonomic study. J Gen Microbiol 1966;43:159–271.