

## '*Jeotgalicoccus 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 '*Jeotgalicoccus saudimassiliensis*' strain I3MG44\_air<sup>T</sup> (CSUR P1221), a new species of the *Jeotgalicoccus* genus that was isolated from air samples in the city environment of Makkah, Saudi Arabia, during the pilgrim period of Hajj 2012. © 2016 The Authors. Published by Elsevier Ltd on behalf of European Society of Clinical Microbiology and Infectious Diseases.

**Keywords:** Air isolates, culturomics, '*Jeotgalicoccus saudimassiliensis*', Saudi Arabia

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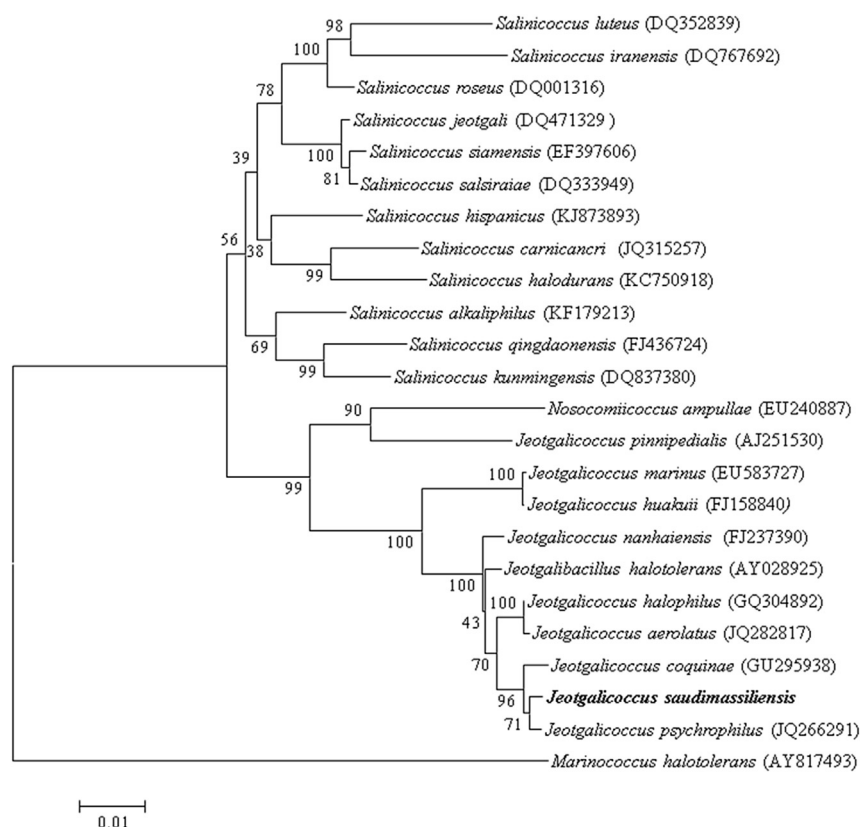
As a part of a wider culturomics [1] and metagenomics study [2] in Saudi Arabia, we isolated a new bacterium, strain I3MG44\_air<sup>T</sup>, from two air samples in the urban environment of Makkah, Saudi Arabia, during the pilgrim period of Hajj 2012. For each air sample, a volume of 1 m<sup>3</sup> was collected with a 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. The strain I3MG44\_air<sup>T</sup> was cultured in 5% sheep's blood-enriched Columbia agar (bioMérieux, Marcy l'Étoile, France) for 2 days in an aerobic atmosphere at 37°C. Growth was observed in the range 0 to 15% NaCl with an optimum at 5% NaCl in aerobic conditions, and no growth occurred in anaerobic conditions. Strain I3MG44\_air<sup>T</sup> colonies on Columbia agar were opaque, round and white-grey in color, and they varied between 1.2 to 2.7 mm in diameter. The strain I3MG44\_air<sup>T</sup> is a Gram-positive, aerobic, nonmotile, catalase- and oxidase-positive, coccus-shaped organism. No

identification was obtained for the strain I3MG44\_air<sup>T</sup> 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).

The complete 16S rRNA gene was sequenced using fD1-rP2 primers as previously described and a 3130-XL sequencer (Applied Biosciences, Saint Aubin, France) [3]. The strain I3MG44\_air<sup>T</sup> exhibited a 98.5% sequence similarity with *Jeotgalicoccus psychrophilus* (JQ266291) which was the phylogenetically closest species with standing in nomenclature (Fig. 1). Consequently it putatively classifies the strain I3MG44\_air<sup>T</sup> as a new member of the genus *Jeotgalicoccus* within the family *Staphylococcaceae* in the phylum *Firmicutes*. The genus *Jeotgalicoccus* was first described by Yoon *et al.* in 2003 by the isolation of *Jeotgalicoccus halotolerans* and *Jeotgalicoccus psychrophilus* in a traditional Korean fermented seafood [4]. The genus *Jeotgalicoccus* was later emended by Liu *et al.* by the isolation of *Jeotgalicoccus nanhaiensis* from intertidal sediment [5]. *Jeotgalicoccus* species were detected as inhabitants of a bovine teat canal [6], and recently *Jeotgalicoccus aerolatus* was isolated from bio-aerosol samples from a poultry-fattening industry and *Jeotgalicoccus coquinae* was isolated from coquina, a food supplement for female ducks used in a duck-fattening farm [7].

Strain I3MG44\_air<sup>T</sup> exhibited a 16S rRNA gene sequence divergence of >1.3% with *J. psychrophilus*, the closest related

**FIG. 1.** Phylogenetic tree highlighting position of '*Jeotgalicoccus saudimassiliensis*' relative to other phylogenetically close members of *Jeotgalicoccus* genus. Numbers at nodes are percentages of bootstrap values obtained by repeating analysis 500 times to generate majority consensus tree. Scale bar represents 1% nucleotide sequence divergence.



species with standing in nomenclature, which classifies it as a new representative of the *Jeotgalicoccus* genus isolated from air samples in the urban environment of Makkah. As a result, we propose the creation of '*Jeotgalicoccus saudimassiliensis*' sp. nov., and the strain I3MG44\_air as the type strain.

### MALDI-TOF MS spectrum

The MALDI-TOF MS spectrum of strain I3MG44\_air<sup>T</sup> is available online (<http://www.mediterranee-infection.com/article.php?lref=256&titre=urms-database>).

### Nucleotide sequence accession number

The 16S rRNA gene sequence of strain I3MG44\_air<sup>T</sup> was deposited in GenBank under accession number HG931342.1.

### Deposit in a culture collection

Strain I3MG44\_air<sup>T</sup> was deposited in the Collection de Souches de l'Unité des Rickettsies (CSUR, WDCM 875) under number PI221.

### Acknowledgements

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### Conflict of Interest

None declared.

### References

- [1] Angelakis E, Yasir M, Azhar El, 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 El, Lagier JC, Bibi F, et al. Gut microbiome and dietary patterns in different Saudi populations and monkeys. *Sci Rep* 2016;6:32191.
- [3] 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.

- [4] Yoon JH, Lee KC, Weiss N, Kang KH, Park YH. *Jeotgalicoccus halotolerans* gen. nov., sp. nov. and *Jeotgalicoccus psychrophilus* sp. nov., isolated from the traditional Korean fermented seafood jeotgal. *Int J Syst Evol Microbiol* 2003;53:595–602.
- [5] Liu ZX, Chen J, Tang SK, Zhang YQ, He JW, Chen QH, et al. *Jeotgalicoccus nanhaiensis* sp. nov., isolated from intertidal sediment, and emended description of the genus *Jeotgalicoccus*. *Int J Syst Evol Microbiol* 2011;61:2029–34.
- [6] Gill JJ, Sabour PM, Gong J, Yu H, Leslie KE, Griffiths MW. Characterization of bacterial populations recovered from the teat canals of lactating dairy and beef cattle by 16S rRNA gene sequence analysis. *FEMS Microbiol Ecol* 2006;56:471–81.
- [7] Martin E, Klug K, Frischmann A, Busse HJ, Kampfer P, Jackel U. *Jeotgalicoccus coquinae* sp. nov. and *Jeotgalicoccus aerolatus* sp. nov., isolated from poultry houses. *Int J Syst Evol Microbiol* 2011;61:237–41.