

# '*Arthrobacter saudimassiliensis*' sp. nov. a new bacterial species isolated from air samples in the urban environment of Makkah, Saudi Arabia

A. Papadioti<sup>1</sup>, E. I. Azhar<sup>2,3</sup>, F. Bibi<sup>2</sup>, A. Jiman-Fatani<sup>4</sup>, S. M. Aboushoushah<sup>2</sup>, M. Yasir<sup>2</sup>, D. Raoult<sup>1,2</sup> and E. Angelakis<sup>1</sup>

1) Unité de Recherche sur les Maladies Infectieuses et Tropicales Emergentes: URMITE CNRS-IRD 198 UMR 6236, Aix Marseille Université, Faculté de Médecine, Marseille, France, 2) Special Infectious Agents Unit, King Fahd Medical Research Centre, King Abdulaziz University, Jeddah, Saudi Arabia, 3) Department of Medical Laboratory Technology, Faculty of Applied Medical Sciences, King Abdulaziz University, Jeddah, Saudi Arabia and 4) Department of Medical Microbiology and Parasitology, Faculty of Medicine, King Abdulaziz University, Jeddah, Saudi Arabia

## Abstract

We report here the main characteristics of '*Arthrobacter saudimassiliensis*' strain I1W110\_air<sup>T</sup> (CSUR PI223), a new species of the *Arthrobacter* genus that was isolated from air samples in the city environment of Makkah, Saudi Arabia, during the pilgrim period of Hajj 2012. © 2017 The Authors. Published by Elsevier Ltd on behalf of European Society of Clinical Microbiology and Infectious Diseases.

**Keywords:** Air isolates, '*Arthrobacter saudimassiliensis*' sp. nov., culturomics, new species, Saudi Arabia

**Original Submission:** 7 December 2016; **Revised Submission:** 26 December 2016; **Accepted:** 26 December 2016

**Article published online:** 3 January 2017

**Corresponding author:** E. Angelakis, Unité de Recherche sur les Maladies Infectieuses et Tropicales Emergentes: URMITE CNRS-IRD 198 UMR 6236, Aix Marseille Université, Faculté de Médecine, 27 Bd Jean Moulin, 13385 Marseille, France  
E-mail: [e.angelakis@hotmail.com](mailto:e.angelakis@hotmail.com)

As a part of a wider culturomics and metagenomics study [1,2] in Saudi Arabia we isolated a new bacterium named strain I1W110\_air<sup>T</sup> from two air samples in the urban environment of Makkah, Saudi Arabia, during the pilgrim period of Hajj 2012. No identification was obtained for strain I1W110\_air<sup>T</sup> using systematic matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS) screening on a MicroFlex spectrometer (Bruker Daltonics, Bremen, Germany) [3]. The strain I1W110\_air<sup>T</sup> was cultured in 5% sheep blood-enriched Columbia agar (bioMérieux, Marcy l'Étoile, France) for 1 day in an aerobic atmosphere at 37°C. Growth was observed only in aerobic conditions and no growth occurred in anaerobic conditions. Colonies on Columbia agar were opaque, round and yellow. Optimal growth for this strain was obtained at 37°C at pH 7. The strain I1W110\_air<sup>T</sup> is a Gram-positive bacterium, aerobic, motile, catalase positive and oxidase negative.

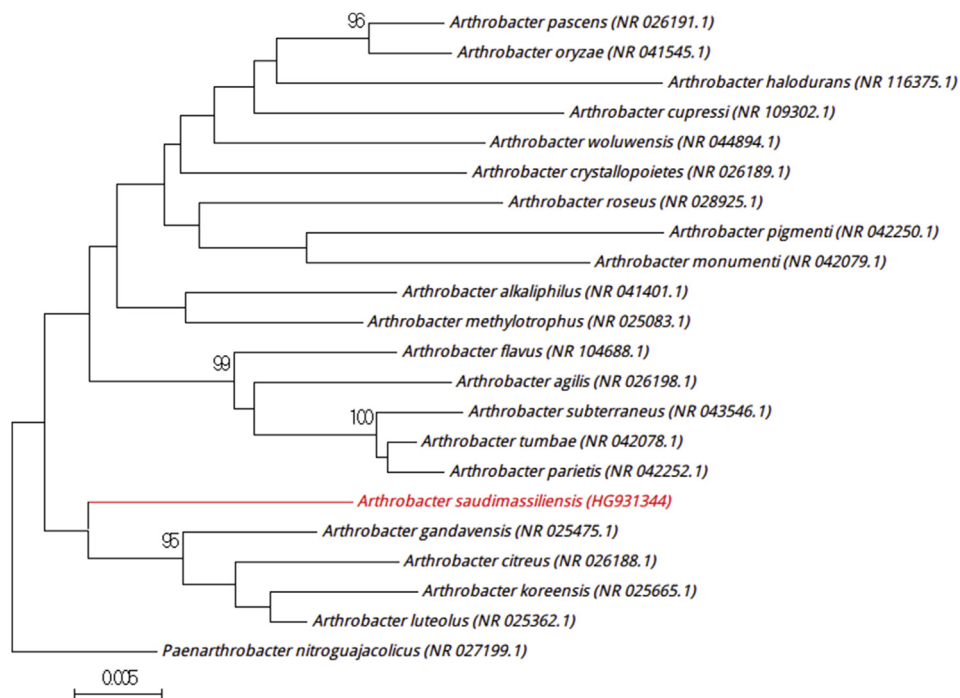
The complete 16S rRNA gene was sequenced using fD1-rP2 primers as previously described and a 3130-XL sequencer

(Applied Biosciences, Saint Aubin, France) [4]. The strain I1W110\_air<sup>T</sup> exhibited a 97.4% sequence similarity with *Arthrobacter luteolus* (NR025362), which was the phylogenetically closest species with standing nomenclature (Fig. 1). Consequently, it putatively classifies the strain I1W110\_air<sup>T</sup> as a new member of the genus *Arthrobacter* within the family Micrococcaceae in the phylum Actinobacteria. *Arthrobacter luteolus* was first described by Wauters et al. in 2000 as an aerobic, Gram-positive coryneform bacteria isolated from an infected surgical wound [5]. So far, the genus *Arthrobacter* includes more than 87 species with validly published names (<http://www.bacterio.cict.fr/c/arthrobacter.html>).

Strain I1W110\_air<sup>T</sup> exhibited a 16S rRNA gene sequence divergence >1.3% with *A. luteolus*, the closest related species with standing in nomenclature, which classifies it as a new representative of the *Arthrobacter* genus isolated from air samples in the urban environment of Makkah. As a result, we propose the creation of '*Arthrobacter saudimassiliensis*' sp. nov., and the strain I1W110\_air<sup>T</sup> as the type strain.

**MALDI-TOF MS spectrum accession number.** The MALDI-TOF MS spectrum of '*Arthrobacter saudimassiliensis*' I1W110\_air<sup>T</sup> is available online (<http://www.mediterranean-infection.com/article.php?laref=256&titre=urms-database>).

**Nucleotide sequence accession number.** The 16S rRNA gene sequence of the strain I1W110\_air<sup>T</sup> was deposited in GenBank under Accession number HG931344.



**FIG. 1.** Phylogenetic tree highlighting the position of ‘*Arthrobacter saudimassiliensis*’ relative to the phylogenetically closest members of the *Arthrobacter* genus. Numbers at the nodes are percentages of bootstrap values obtained by repeating the analysis 500 times to generate a majority consensus tree. Only values >95% are displayed. The scale bar represents a 0.5% nucleotide sequence divergence.

**Deposit in a culture collection.** Strain 11W110<sub>air</sub><sup>T</sup> was deposited in the Collection de Souches de l’Unité des Rickettsies (CSUR, WDCM 875) under number P1223.

### Transparency declaration

The authors have stated that there are no conflicts of interest.

### Acknowledgements

This work was funded by the Deanship of Scientific Research (DSR), King Abdulaziz University, under grant No. (I-141/1433 HiCi). The authors, therefore, acknowledge technical and financial support of KAU.

### 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] Seng P, Drancourt M, Gouriet F, La Scola B, Fournier PE, Rolain JM, et al. Ongoing revolution in bacteriology: routine identification of bacteria by matrix-assisted laser desorption ionization time-of-flight mass spectrometry. *Clin Infect Dis* 2009;49:543–51.
- [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] Wauters G, Charlier J, Janssens M, Delmee M. Identification of *Arthrobacter oxydans*, *Arthrobacter luteolus* sp. nov., and *Arthrobacter albus* sp. nov., isolated from human clinical specimens. *J Clin Microbiol* 2000;38:2412–5.