Reclassification of *Brevibacterium liquefaciens* Okabayashi and Masuo 1960 as *Arthrobacter nicotianae* Giovannozzi-Sermanni 1959

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Brevibacterium liquefaciens ATCC 14929^T was reclassified as *Corynebacterium liquefaciens* by Lanéele *et al.* (1980). A further study by Stackebrandt *et al.* (1983) described the same strain, indicating high genomic and chemotaxonomic relatedness to *Arthrobacter nicotianae*; however, reclassification was not formally proposed. Because of the discrepancies between their previous work and the data of Collins & Kroppenstedt (1983), Lanéele and colleagues re-examined *B. liquefaciens* and withdrew their recommendation for the assignment of *B. liquefaciens* to the genus *Corynebacterium* (Lanéele *et al.*, 1984). Formal reclassification of *B. liquefaciens* as *A. nicotianae* is now proposed.

Brevibacterium liquefaciens Okabayashi & Masuo 1960 ATCC 14929^T (=DSM 20579^T=NCIMB 9545^T=LMG 16159^T; Skerman *et al.*, 1980) was combined with *Corynebacterium liquefaciens* by Lanéele *et al.* (1980), with ATCC 14929^T as the type strain, on the basis of shared physiological, cell wall and lipid attributes and DNA–DNA homology with *Corynebacterium diphtheriae* PW8. However, the results of Lanéele *et al.* (1980) did not agree with those obtained by Collins & Kroppenstedt (1983), who showed that the lipid composition of *C. liquefaciens* NCIMB 9545^T was quite different from that of *C. diphtheriae*; nor did they agree with the data of Stackebrandt *et al.* (1983). These authors determined the DNA G + C contents of and carried out DNA–DNA hybridization studies on *Arthrobacter nicotianae* DSM 20123^T (=NCIMB 9458^T) and *C. liquefaciens* DSM 20579^T, and provided data that were sufficient to suggest that *C. liquefaciens* should be combined with *A. nicotianae*. Although they were surprised to find that strain ATCC 14929^T showed such high similarity to *A. nicotianae*, Stackebrandt *et al.* (1983) did not formally propose any union of *A. nicotianae* and *C. liquefaciens*, as the identity of strains of *C. liquefaciens* (*B. liquefaciens*) that were deposited in various culture collections had not been confirmed. At this point, it may be interesting to note that the Deutsche Sammlung von Mikroorganismen und Zellkulturen (DSMZ, Braunschweig, Germany) obtained *B. liquefaciens* DSM 20579^T from the National Collection of Industrial and Marine Bacteria (NCIMB 9545^T; Aberdeen, Scotland, UK), where it is deposited as *B. liquefaciens*. NCIMB, in turn, obtained their strain from the American Type Culture Collection (ATCC 14929^T; Manassas, VA, USA), where it is deposited as *C. liquefaciens*.

Because of the differences between their data and those of

other workers, Lanéele *et al.* (1984) re-examined strain ATCC 14929^T. The results they obtained disagreed with those of Lanéele *et al.* (1980), but agreed with those of Collins & Kroppenstedt (1983). Consequently, Lanéele *et al.* (1984) withdrew their recommendation for the assignment of *B. liquefaciens* to the genus *Corynebacterium*, assuming the mislabelling of strain ATCC 14929^T in one of the laboratories that were responsible for the work.

Moreover, both *Bergey's Manual of Systematic Bacteriology* (Jones & Kiedde, 1986; Kiedde *et al.*, 1986) and the DSMZ still consider *B. liquefaciens* to be *A. nicotianae*, even though no official renaming has occurred.

In this paper, we propose that *B. liquefaciens* ATCC 14929^T should be assigned to *A. nicotianae* based on: (i) 98.8% 16S rDNA sequence similarity between *B. liquefaciens* DSM 20579^T and *A. nicotianae* DSM 20123^T (our confirmation; GenBank accession numbers AJ251417 and X80739, respectively); (ii) similar menaquinone profiles (Collins & Kroppenstedt, 1983); (iii) identical chromatographic mobility of glycolipids (Collins & Kroppenstedt, 1983); (iv) identical polar lipid patterns for *A. nicotianae* and *B. liquefaciens* (Collins & Kroppenstedt, 1983); and (v) the same peptidoglycan variation (A4 α) (Stackebrandt *et al.*, 1984). Furthermore, the DNA G + C content of *B. liquefaciens* (63.2%) fits the range of DNA G + C contents for the genus *Arthrobacter sensu stricto* (59–66 mol%) (Stackebrandt *et al.*, 1983). SDS-PAGE was carried out in our laboratory on *B. liquefaciens* LMG 16159^T [obtained from the Japan Collection of Microorganisms, RIKEN, Japan (JCM 1970^T), who, in turn, obtained their strain from the ATCC (ATCC 14929^T)] and it was identified as *A. nicotianae*. SDS-PAGE profiling of whole-cell proteins

provides valuable information on the similarity of bacteria at the species and subspecies levels (Vandamme *et al.*, 1996). Finally, the earlier DNA–DNA hybridization data of Stackebrandt *et al.* (1983) clearly show high relatedness (90 % similarity) between *B. liquefaciens* and *A. nicotianae*.

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