The Generic Classification of Certain Cellulolytic Bacteria

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Some 30 species of cellulolytic, nonsporing bacteria were described during the period 1912–1916 by Kellerman and his associates (6, 7, 8, 9). Species distinctions for the most part were based on minor cultural differences. Most of these proposed species, without further study, subsequently were placed by Bergey (1) in the genus Cellulomonas.

During the course of extended investigations of the punctiform-colony, noncellulolytic bacteria in soil, Conn (3) noted that many isolates of this group appeared as gram-negative rods in young culture, but as gram-positive cocci or irregular short rods in older culture. He designated such isolates as Bacterium globiforme. Jensen (5), independently studying the commonly occurring bacteria of soil, encountered similar types of organisms, but considered them to be members of the genus Corynebacterium. Of particular interest is the fact that he obtained a culture of Cellulomonas fimi and, following laboratory study, re-designated it as Corynebacterium fimi. Zimmerman’s Bacillus helvolus was assigned to Corynebacterium, as were also the two new species, C. simplex and C. tumescens (5).

Conn and Dimmick (4) recently have objected to broadening of Corynebacterium to include the saprophytic bacteria common in soil, and have proposed that the globiforme group of soil organisms be designated generically as Arthrobacter. Cultures of Corynebacterium helvolus and of C. tumescens obtained from Jensen were also placed as Arthrobacter. Whether C. fimi, which Jensen (5) had grouped generically with the two species just named, should likewise be assigned to Arthrobacter was not considered.

The lack of such information concerning Corynebacterium fimi, together with the unsatisfactory and uncertain status of the genus Cellulomonas in the current edition of Bergey’s Manual (2), has led to the comparison of a number of named cultures of species of Cellulomonas and Arthrobacter. It is the purpose of this paper to summarize certain characteristics that were observed for species of the two groups naming, at the same time to emphasize the lack of generic distinction between Corynebacterium fimi and many cultures of Cellulomonas.

EXPERIMENTAL

Eleven cultures at one time or another designated as Cellulomonas or at least as cellulolytic, and 13 cultures of Arthrobacter were obtained for the current study. The cultures employed were as follows:

"Cellulolytic" group
1. Bacterium fimi NRS-133.
5. Cellulomonas cellacea ATCC-487.
6. Cellulomonas flavigena ATCC-482.
7. Cellulomonas gelida ATCC-488.
8. Cellulomonas subalbus ATCC-489.
11. Corynebacterium fimi ATCC-8183.

"Arthrobacter" group
12. Arthrobacter globiforme, Conn’s type strain.
13. Arthrobacter globiforme, var. 'aurescens'
14. Arthrobacter globiforme, var. 'aurescens'
15. Arthrobacter globiforme, var. 'aurescens'
16. Arthrobacter globiforme, var. 'simplum'
17. Arthrobacter globiforme, var. 'simplum'
18. Arthrobacter globiforme, var. 'simplum'
19. Arthrobacter globiforme, var. 'simplum'
20. Arthrobacter helvolus, Conn’s “Jensen”
21. Arthrobacter tumescens, Conn’s “Jensen”

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