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### Defining natural species of bacteria by a common yardstick: Universal genomic parameter to delineate bacteria into discrete phylogenetic clusters

Bacteria are classified, like higher organisms into species but the current taxonomic species contain bacteria of enormous phylogenetic diversity, causing serious confusions in medical practice and other fields. Therefore, a common yardstick is badly needed for universally defining bacterial species by using a parameter that produces discrete rather than continual data to reveal clear-cut distinctions among the species. Using *Salmonella* as the primary model to search for such delineating genomic parameters, we found that members of a monophyletic bacterial grouping equivalent to natural species have a high percentage of their common genes sharing identical nucleotide sequences. The percentage windows are mostly broad: >70% for members within a species and <10% for bacteria between species. Similarly, broad percentage windows were also seen in *Streptomyces*; we propose percentages (<70%) to reflect genetic boundaries and exclude bacteria from a species. The clear-cut nature of such percentages makes them suitable as a common yardstick to define natural bacterial species. The broad percentage windows could be interpreted as the results of non-overlapping gene pools; bacteria of the same gene pool can purge less adapted members once they acquire beneficial traits, but they cannot do that across different gene pools.

### Biography

Shu-Lin Liu has his expertise in bacterial systematics and evolution. He was the first in the world to conduct comparative genomic studies on *Salmonella* bacteria and uncovered a series of genomic evolutionary events, with findings published in *PNAS*, *Journal of Bacteriology*, *Molecular Biology and Evolution*, etc. He teaches microbiology, genomics, evolution and classic Chinese literature. He has an Adjunct Academic position at University of Calgary, Canada and conducted teaching and research. As the Dean of College of Pharmacy, Harbin Medical University, he was active in international collaboration and communication activities and organized a broad range of exchange programs with international institutions including University of British Columbia, University of Calgary, Canada and Purdue University, University of Missouri, Kentucky State University, USA, etc.

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