What's in a Name? The Taxonomic Overview of the Genus *Elizabethkingia*

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With the utilization of genomic sequencing, a wide variety and number of new and reclassified bacterial species has been generated. This naming of a new or renaming old bacterial species is a highly formal process and the rules of the *Bacteriological Code* are followed. As part of this process, a new species name must either be placed on a validation list in the *International Journal of Systematic and Evolutionary Microbiology* (IJSEM) or must be published as a full report in the IJSEM to become valid. The challenge for clinical microbiologists is to keep current on this changing nomenclature. This series on bacterial taxonomy was begun with the last newsletter with a goal to provide guidance for the clinical microbiologist to keep accurate in the reporting of a bacterial pathogen. The inaugural article in this series described species within the genus *Citrobacter*. This report describes a new genus composed of two new closely related species, *Elizabethkingia meningoseptica* (originally identified as *Flavobacterium meningosepticum*) and *E. miricola* .

Historically, the genus *Flavobacterium* was created in 1923 for those gram-negative non-sporulating yellow-pigmented rods that weakly produced acid from carbohydrates. Since this original classification, several *Flavobacterium* species have been reclassified into new or other genera, such that species within this genus are now seldom detected as causes of human disease. One new genus that was included in this reclassification was *Chryseobacterium* **[3]**. This genus included a newly named species called *Chryseobacterium meningosepticum* which replaced the previously named species *Flavobacterium meningosepticum*.

Recent studies have now revealed that the genus *Chryseobacterium* was genetically heterogeneous. Two of the previous 10 species recognized in this genus can be readily differentiated from the other *Chryseobacterium* species by both 16S rRNA sequence comparison analysis and DNA-DNA hybridization studies **[1]**. These two species were subsequently placed into a new genus called *Elizabethkingia*, named in honor of Elizabeth King, the individual who in 1959 described bacteria associated with infant meningitis **[2].** These two closely related species were subsequently validated in 2005 and became known as *Elizabethkingia meningoseptica* (epithet name referring to the association of this bacterium to both meningitis and to septicemia) and *Elizabethkingia miricola* (epithet name derived from the words "mir" which means peace and "incola" which means inhabitant; where the combined name refers to an inhabitant of the MIR space station where the isolate was first detected) **[1]**.

The major characteristics for both the *Elizabethkingia* and *Chryseobacterium* species is the production of oxidase, the ability to produce indole, and the presence of a non-fermenting gram-negative rod that grows on MacConkey agar. The major phenotypic characteristic to separate the *Elizabethkingia* species from *Chryseobacterium indologenes* (the most common species causing human disease in this genus) is by the lack of a yellow pigment in culture (see **Table**). Although most commercial identification systems still include *C. meningosepticum* in their databases, the identification of *C. meningosepticum* by a commercial test should now be reported as either *E. meningoseptica* or *E. miricola* depending on the organisms ability to hydrolyze urea (*E. miricola* is positive).

Reference laboratories are available to provide sequence comparison analysis testing to help validate the identification of the *Elizabethkingia* species or other microbial pathogens when necessary. Although the NPHL does not provide this service, molecular tools are available at UNMC to identify microbial pathogens for research purposes. For additional information of the availability of this service, contact Dr. Iwen at 402-559-7774.

References
1. Kim, KK, MK Kim, JH Lim, HY Park, and ST Lee. 2005. Transfer of *Chryseobacterium meninosepticum* and *Chryseobacterium miricola* to *Elizabethkingia* gen. nov. as *Elizabethkingia meningoseptica* comb. nov. and *Elizabethkingia miricola* comb. nov. Int. J. Syst. Evol. Microbiol. **55**: 1287-1293.
2. King, EO. 1959. Studies on a group of previously unclassified bacteria associated with meningitis in infants. Am. J. Clin. Path. **31**: 241-247.
3. Vandamme, P, JF Bernardt, P Segers, K Kersters, and B Holmes. 1994. New perspectives in the classification of the flavobacteria; description of *Chryseobacterium* gen. nov., *Bergeyella* gen. nob., and *Empedobacter* non. rev. Int. J. Syst. Bacteriol. **44**: 827-831.

Table. Major phenotypic characteristics to differentiate among the oxidase-positive, indole-positive nonfermenting gram-negative rods that grow on MacConkey agar.[a]

Characteristics	*Elizabethkingia meningoseptica*	*Elizabethkingia miricola*	*Chryseobacterium indologenes*
Yellow pigment	N	N	P
Gelatin hydrolysis	P	P	P
Esculin hydrolysis	P	P	P
Urea hydrolysis	N	P	N

Abbreviations: N, negative; P, positive.
[a]Bacterial species within this group that are closely related, but do not readily grow on MacConkey agar include *Empedobacter brevis*, *Weeksella virosa*, *Bergeyella zoohelcum*, and *Balneatrix alpica*.