CONTRIBUTION TO THE TAXONOMIC
STUDIES OF *Serratia kiliensis* (Lehmann
et Neumann) Bergey

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SUMMARY: A study of the morphological, cultural and biochemical features of five strains of *Serratia kiliensis* (Lehmann et Neumann) Bergey from different culture collections leads to the conclusion that *Serratia kiliensis* is a variety of *Serratia marcescens*.

In 1888 a red pigmented microorganism, which was called only bacterium h, was isolated from drinking water by Breunig in Kiel. The name *Bacterium kiliense* was given to it later by Lehmann and Neumann (1896). This species was placed in the genus *Serratia* by Bergey (1923) with the name *Serratia keilensis* (sic). Breed (1957) corrected the spelling of the specific epithet to *kiliensis*. Some authors (Lehmann and Neumann 1927, Breed 1957, Davis et al., 1957) have suggested that *Serratia kiliensis* is a variety of or identical with *S. marcescens*. However, *S. kiliensis* is still given specific status by authors (Krasilnikov 1949, Breed 1957).

We have therefore undertaken to ascertain whether *S. kiliensis* and *S. marcescens* are synonyms.

MATERIAL AND METHODS

We have studied 5 strains supplied as *Serratia kiliensis* by various culture collections. Strain 274 was from the Department of Agriculture, Ottawa, Canada; strain 300 from Department of Biological Sciences, Purdue University, Indiana; strain 526 from J. Simpson, Prairie Regional Laboratory, Saskatoon, Canada, strains 7462 and 922 from the American Type Culture Collection.

The methods used were the same as in our previous work (Martinec and Kocur 1960).

RESULTS

Morphology. All five strains formed small Gram negative rods, singly or in groups. $0.8 \times 1.5-2.0\mu$. All strains were motile.

Cultural characteristics. Colonies were round with undulate margin, slightly convex, smooth. On nutrient agar two strains only were pigmented. In nutrient broth all strains produced turbidity and sediment, two strains formed a fragile pellicle. On potato, gelatin and on medium Dewey and Poe (1943) only 2 strains were pigmented.

Biochemical characteristics. The ascertained biochemical characteristics are shown in Table 1.

DISCUSSION

No essential differences in morphological and cultural characters were found among the five strains studied. Some minor differences appeared in the biochemical characteristics. Strain 526 hemolysed blood and did not form gas from glucose, strains 582, 274 and 581 fermented lactose. The variability in fermenting lactose and producing gas agrees with the description given by Davis et al. (1957).

In other respects our results agree with the original description (1888) as well as with the data given by Krasilnikov (1949) and Breed (1957). Breed (as well as some other authors) suggests that S. kiliensis is probably identical with Serratia marcescens but does not prove this identity experimentally. He stated that it is uncertain whether the microorganism isolated by Breunig (1888) was a strain of Serratia marcescens not heavily pigmented. Our results confirm this supposition. Breed also states that one of the features differentiating S. kiliensis from S. marcescens is the fact that S. kiliensis does not produce acethylmethylcarbinol. Out of five strains studied only the strain 526 produced acethylmethylcarbinol. Besides this difference, however, we have ascertained no other difference between S. kiliensis and S. marcescens. Comparison of our results with those of Breed (1957), Davis et al. (1957) and with our earlier work (Martinec and Kocur 1959) leads us to the conclusion that S. kiliensis is only a variety of S. marcescens. This conclusion is reached because no production of acethylmethylcarbinol is the only single one of the substantial biochemical

Table 1. Results of biochemical tests with 5 strains
of Serratia kiliensis.

Test	Number Positive	Number Negative
Gelatin liquefaction	5	0
Casein hydrolysis	5	0
Nitrate reduction	5	0
Hydrogen sulfide I.	5	0
Hydrogen sulfide II.	0	5
Indole	0	5
Milk	5	0
Hemolysis	1	4
Glucose	5	0
Gas from glucose	4	1
Lactose	3 d	2
Sucrose	5	0
Maltose	4	1
Galactose	5	0
Fructose	5	0
Rhamnose	0	5
Mannose	4	1
Inulin	4	1
Xylose	4	1
Arabinose	0	5
Glycerol	4	1
Adonitol	0	5
Sorbitol	5	0
Mannitol	5	0
Dulcitol	0	5
Starch	0	5
Esculin	5	0
Koser's citrate	5	0
Simmons' citrate	5	0
Acethylmethylcarbinol	1	4
Methyl red	0	5
KCN	5	0
Phenylalanin	0	5
Catalase	5	0
Urease	0	5
Lipase	5	0
5% NaCl	5	0
7.5% NaCl	4	1
Pigment	2	3

Hydrogen sulfide I. = lead acetate papers

Hydrogen sulfide II. = modified Klinger's agar

d = delayed

features which is suitable in taxonomic differentiation of the Serratia genus. According to our opinion the mentioned biochemical test is a more substantial feature than the strain differences in fermenting of carbohydrates or in pigmentation, etc.

From our previous work (Martinec and Kocur, 1961) and from present study it follows that the genus Serratia includes only one species - S. marcescens with the variety Serratia marcescens var. kiliensis.

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