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## From Butyribacterium to E. coli : An Essay on Unity in Biochemistry

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### Abstract

New ideas in science frequently arise from neglected or distorted antecedents. This essay deals with the idea of biochemical unity, encapsulated in Jacques Monod's well-known phrase, dating from 1954: "Anything found to be true of E. coli must also be true of elephants." An earlier version of this phrase,—"From the elephant to butyric acid bacterium—it is all the same!"—was coined in 1926 by the Dutch microbiologist Albert Jan Kluyver. In that year Kluyver and his associate Hendrick Jean Louis Donker published a celebrated paper, "Unity in Biochemistry." The concept of biochemical unity had many antecedents, but these had never caught on. The Kluyver-Donker paper has often been regarded to provide a boost to biochemical and especially to microbiological thinking. Its interpretations and misinterpretations represent an encapsulated history of biochemistry. The present paper examines the history of the concept of



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HERBERT C. FRIEDMANN

**ABSTRACT** New ideas in science frequently arise from neglected or distorted antecedents. This essay deals with the idea of biochemical unity, encapsulated in Jacques Monod's well-known phrase, dating from 1954: "Anything found to be true of *E. coli* must also be true of elephants." An earlier version of this phrase,—"From the elephant to butyric acid bacterium—it is all the same!"—was coined in 1926 by the Dutch microbiologist Albert Jan Kluver. In that year Kluver and his associate Hendrick Jean Louis Donker published a celebrated paper, "Unity in Biochemistry." The concept of biochemical unity had many antecedents, but these had never caught on. The Kluver-Donker paper has often been regarded to provide a boost to biochemical and especially to microbiological thinking. Its interpretations and misinterpretations represent an encapsulated history of biochemistry. The present paper examines the history of the concept of biochemical unity from before to beyond Kluver, investigates the two "elephant" phrases and their possible relationships, and ends with a discussion of the attractiveness of unifying ideas in science.

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