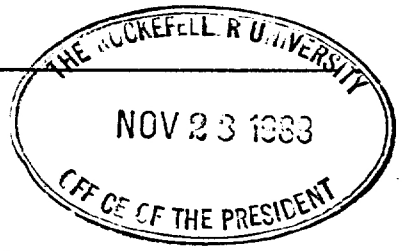
→ JL
Status report

University of Wisconsin–Madison



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November 20, 1988

Dr. Joshua Lederberg
The Rockefeller University
New York, NY 10021

Dear Josh,

I have your inquiry regarding Koch and Darwin. I cover this in a chapter of my book, but unfortunately, the manuscript is still too scribbled to send you a copy. However, I can state categorically that Koch and his school were aware of Darwin. Ferdinand Cohn actually visited Darwin in England in 1876, at a time that he and Koch were close. Further, Flügge, one of Koch's closest associates, wrote extensively of bacterial variation and Darwinian evolution in bacteria in his book published in 1886. You certainly have the English translation of this book in your library. The Darwin material is in the Appendix.

Flügge, C. 1886. Fermente und Mikroparasiten. Vogel, Leipzig.
The English translation was published in 1890 by the New Sydenham Society in London (translated by W.W. Cheyne).

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The strongest proponent of sexual cycles in bacteria at this time was W. Zopf, who published a book and several papers on this subject. For instance, in 1881 he published a paper in the Monatsberichte der Akademie der Berlin (pp. 277-284) entitled "Genetic relationships of fission fungi" (my translation). He had also described life cycles in the iron bacterium Crenothrix polyspora in 1879. However, Flügge thinks that Zopf was working with contaminated cultures.

One of the difficulties of studying variation in bacteria in those days was that everyone worked with complex media, so that only colonial variation could be observed. Flügge describes various morphological forms of colonies, but does not come down very firmly on the side of variability. It must have been in the 1890's that medical bacteriologists gradually began to think about variability, when they could characterize bacteria antigenically and began to see antigenic (as well as virulence) variations. Richard Pfeiffer did some fine work on Vibrio cholerae in this regard, and clearly distinguished pathogenic from nonpathogenic isolates. In 1900, prompted by de Vries, Beijerinck's first paper on mutation appeared. The topic of mutation was frequently discussed in papers and textbooks after this time. However, it was frequently confused by ideas on bacterial life cycles. Do you known Löhnis' 1921 book published as a Memoir of the U.S. National Academy of Sciences, entitled Studies upon the life cycles of the bacteria. Part I. Review of the literature, 1838-1919? As far as I can determine, you did not cite this in any of your early papers.

I hope the above is of some help.

Sincerely,

TDB

Thomas D. Brock
E.B. Fred Professor of Natural Sciences